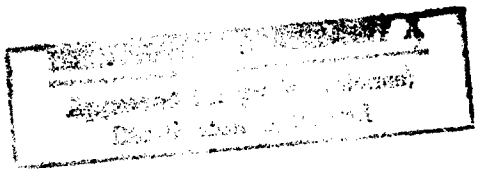
JPRS-TTP-85-009

9 April 1985

Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT



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WORLDWIDE REPORT

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HONG KONG

TELEVISION BROADCAST LTD PROPOSES RADIO, TV CHANGES

TV Satellite Plan

Hong Kong SOUTH CHINA MORNING POST in English 7 Feb 85 p 12

[Article by Rosalyn Pang]

[Text] Television Broadcasts Ltd want to be allowed directly to use satellites to communicate with overseas stations.

At the moment Cable and Wireless is the only party licensed to receive Intelsat signals in Hongkong.

TVB claims that sometimes microwave services between Hongkong and Macau are unavailable.

And it has asked the Broadcasting Review Board to help it:

- set up its own ground facilities in Hongkong for receiving signals from both public satellites and the Intelsat system, in co-operation with Cable and Wireless;
- drop the idea of a central transmitting body;
- and not re-allocate television channels.

TVB executives also say that, for the benefit of the public, the installation of a Hongkong satellite and costly television technology, like high definition television, should be banned for the time being.

TVB also wants to set up non-satellite facilities to provide its own international television services.

This package would provide the station with a better back-up system and its operating costs would be lowered.

Chairman of the Broadcasting Review Board, Mr Justice Power, said if TVB had a good case against Cable and Wireless, based on the availability of their services, it could ask the Governor for an exemption to the licensing laws.

The Postmaster-General, Mr H.G. Ardley, asked why the station wanted to set up its own earth facilities for public satellites, while there were no public satellites above Hongkong at present.

TVB's Mr Clarence Chang replied that the station was looking to the future when public satellite reception might be possible in Hongkong.

Mr Ardley replied that it was difficult for the board to consider the station's proposals if they were based on hypothetical situations.

TVB director Mr Kevin Lo told the board that a two-channel broadcasting system by public satellite would cost around $70 million and only have a life span of about seven years.

This had to be compared with the existing transmitter network used in Hongkong, which had cost around $10 million to $15 million to establish.

TVB also came out against a cable television system which would be expensive to build and maintain, Mr Lo said.

The estimated cost for each household could reach as much as $4,000.

High definition television — a technology to achieve cinemascope effect on a large television screen — was also expensive and so far no one was able to produce it at a competitive price, Mr Lo said.

Multiplexing, on the other hand, was within the reach of most Hongkong people.

With an adaptor costing about $1,000, a viewer could enjoy programmes with multiplexing effect — stereophonic sound effects or in two languages — with their present television sets, Mr Lo said.

Mr L.S. Ng, TVB's chief engineer, said he did not see any merits in setting up a central transmitting organisation in Hongkong.

At present, the two television stations transmitted their programmes with their own systems.

"Such an organisation could not provide the kind of atmosphere that encouraged healthy competition and the incentive to introduce technical innovations," Mr Ng said.

"It would only complicate both the technical operations and co-ordination of channels," he added.

Mr Ng also told the board that any changes to the allocation of television channels would be costly for Government and broadcasters, and would be inconvenient to the audience.

Radio Regionalization Plan

Hong Kong SOUTH CHINA MORNING POST in English 7 Feb 85 p 12

[Text]

Hongkong's shrinking radio audience needs to tune into a better service to attract listeners back to the airwaves.

The Broadcasting Review Board heard yesterday that a radio "regionalisation" plan — which would involve setting up as many as 49 local stations — had been proposed by Television Broadcasts Ltd.

The station also suggested running seven territory-wide radio services in Hongkong — two or three by the Government and the rest by private enterprise.

At present, Hongkong has three radio stations providing 10 services.

Five are run by Government-owned Radio Television Hongkong, three by Commercial Radio and two by British Forces Broadcasting.

The "regionalisation" plan was put forward by TVB's deputy programme manager, Mr Alex Kwan.

He felt that as Hongkong underwent social and political changes its people would demand more radio.

There would be a greater need for news, current affairs and education programmes and people would want better programme quality too, he said.

Mr Kwan felt the radio industry was not performing well-enough and that new services should be introduced.

More than 95 per cent of households possessed one or more radio sets, he said, yet the number of listeners had dropped in the past few years.

Mr Kwan said the Post Office would allow as many as 14 territory-wide radio services — seven VHF/FM and seven FM/AM.

He suggested the authorities used the AM services for territory-wide broadcasts and the FM services for localised broadcasts.

He said the AM services could be independently run and would cater for the general needs of audiences as well as certain specialised groups of people.

The FM services could form a network of local stations — anything from seven to 49.

The network would divide Hongkong into seven broadcasting zones.

Each zone would have one to seven FM stations, serving listeners on a district level.

Mr Kwan also suggested that the Government run two to three territory-wide AM services for public announcements and education programmes.

Other services could be financed by private enterprise which could, in turn, be financed by advertisements.

A board member, Mr T.L. Tsim, wondered whether competition in the radio industry would then be too strong for stations to survive.

The general manager of TVB, Mr Robert Chan, replied that stations would be able to find new advertisers if they were run on a district basis.

He admitted that if radio prospered, the advertising revenue of television stations might be harmed.

But he believed the effect would be small.

The chairman of the board, Mr Justice Power, said he would examine the proposal before commenting.

CSO: 5540/0022

BRIEFS

DATAPREP CONTRACT--DATAPREP (HK) has won a new contract to supply and install the computer system for Shun Tak Shipping, the main operator of jetfoils and passenger ferries to Macau. The contract is for a highly sophisticated 32-bit Data General MV/4000 system which will be used initially for administration, inventory control and purchase orders, and to be extended to cover general accounting and general personnel records. [Text] [Hong Kong HONGKONG STANDARD in English 30 Jan 85 Business Standard p 4]

CSO: 5540/0022

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PEOPLE'S REPUBLIC OF CHINA

BOOLEAN PUBLIC KEY CRYPTOSYSTEM OF SECOND ORDER

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese No 3, Jul 84 pp 30-37

[Article by Zhou Tongheng [0719 0681 5899] of the Institute of Computing Technology, Chinese Academy of Sciences]

[Text]

Abstract

A new type of public key cryptosystem--the Boolean public key system--was introduced in this paper. Furthermore, a special form of this system--the second order Boolean public key system--was investigated. It had the same authentic characteristics as the RSA system. It was believed that this system is a promising public key cryptosystem in terms of both security and execution speed.

I. Introduction

Public key cryptography is a new cryptosystem. It eliminates the limitation that the same key is required in coding and decoding in a conventional cryptosystem. When different keys are used in encoding and decoding, the encoding key (public key) can be made public without jeopardizing the security of the cryptosystem. Since Diffie et al introduced the public cryptography concept in 1976[1,2], several public key cryptosystems such as the RSA system by Rivest et al[4] and the trap door knapsack approach by Merkle et al[3] were published. A new class of public key cryptosystem--the Boolean public key system--was introduced on the basis of Boolean algebra in reference [5]. In this work, a simple Boolean public key system, the second order Boolean public key system, was investigated.

II. The Boolean Public Key System

Let us assume that $Z_{2,n}$ represents a set comprised of all the n sequence in $\{0,1\}$. If F is the transformation from $Z_{2,n}$, to $Z_{2,m}$, $\emptyset$ then F can be written as $F = (f_1,\ldots,f_m)$. f_i is an n-element Boolean function where $i=1,\ldots,m$. In this form, F is called the Boolean transform from Z_2,n to Z_2,m.

If the Boolean transform G from Z_2,m to Z_2,n exists, for any $X \in Z_2,n$,

$$G \cdot F(X) = X$$

F is reversible and G is called the left inverse of F.

If $F_1,\ldots, F_k$ is a series of reversible Boolean transformation operators from Z_2,n to Z_2,m and $G_1,\ldots G_k$ are their respective left inverse operators, and if the left inverse G_i cannot be easily identified from F_i, then such a Boolean transformation with respect to (F_i,G_i), $i = 1,\ldots,k$, can form a public key cryptosystem. F_i can be the public key and G_i can be the secret key. Such a system is called a Boolean public key system.

In the following, we will study a special Boolean public key system, i.e., the Boolean public key Z_2,n to Z_2,n. If F is the Boolean transform from Z_2,n to Z_2,n with an existing inverse and G is the left inverse of F, then F is the one to one correspondence from Z_2,n to Z_2,n. Hence, for any arbitrary $X \in Z_2,n$, we get

$$G \cdot F(X) = X \text{ and } F \cdot G(X) = X$$

We called F the inverse of G, and G the inverse of F. Furthermore, one can see that the Boolean public key from Z_2,n to Z_2,n has the same "authentic" characteristics as the RSA system.

To study the Boolean public key, we must first study the Boolean transformation.

Let us assume that $f(x_1,\ldots,X_n)$ is a n-variable Boolean function and $||f||$ represents the number of medium and small terms in f or the standard formula. Moreover, let us assume

$$f^y = \begin{cases} f \text{ when } y = 1 \\ \bar{f} \text{ when } y = 0 \end{cases}$$

If $Y \in Z_2,n$, let $F^Y = f_1^{y_1} \cdots f_n^{y_n}$

Lemma 1. If F is the Boolean transform from Z_2,n to Z_2,n, then necessary and sufficient condition for the reversibility of F is $||F^y|| = 1$ for any $Y \in Z_2,n$.

Proof: For an arbitrary X, $Y \in Z_2,n$. The necessary and sufficient condition for $F(X)^y = 1$ is $F(X) = Y$. If F is the Boolean transform from Z_2,n to Z_2,n, then the reversibility of F is equivalent to the one-to-one correspondence of F from Z_2,n to Z_2,n. Hence, the necessary and sufficient condition for F to have an inverse is $||F^y|| = 1$ for an arbitrary $Y \in Z_2,n$.

Lemma 2

$$f_1 \oplus \cdots \oplus f_k = \sum_{\substack{a_1,\ldots,a_k \in (0,1) \\ a_1 \oplus \cdots \oplus a_k = 1}}^{\oplus} f_1^{a_1} \cdots f_k^{a_k}$$

Proof: The theory is proven to be valid when n = 1 by induction. Let us assume that the theory is valid when n = k-1, then

$$f_1 \ominus \cdots \oplus f_K = (f_1 \oplus \cdots \oplus f_{K-1}) \oplus f_K = \overset{\oplus}{\sum_{\substack{a_1,\cdots,a_{K-1}\in\{0,1\} \\ a_1\oplus\cdots\oplus a_{K-1}=1}}} f_1^{a_1}\cdots f_{K-1}^{a_{K-1}} \oplus f_K$$

$$= \overset{\oplus}{\sum_{\substack{a_1,\cdots,a_{K-1}\in\{0,1\} \\ a_1\oplus\cdots\oplus a_{K-1}=1}}} f_1^{a_1}\cdots f_{K-1}^{a_{K-1}} f_K^0$$

$$\oplus \overset{\oplus}{\sum_{\substack{a_1,\cdots,a_{K-1}\in\{0,1\} \\ a_1\oplus\cdots\oplus a_{K-1}=0}}} f_1^{a_1}\cdots f_{K-1}^{a_{K-1}} f_K^1$$

$$= \overset{\oplus}{\sum_{\substack{a_1,\cdots,a_K\in\{0,1\} \\ a_1\oplus\cdots\oplus a_K=1}}} f_1^{a_1}\cdots f_K^{a_K}.$$

We can thus determine the validity of the theory of the reversible Boolean transformation from $Z_{2,n}$ to $Z_{2,n}$.

Theorem 1. When F is the Boolean transform from $Z_{2,n}$ to $Z_{2,n}$, the necessary and sufficient condition for the inverse of F to exist is that for any K different numbers $i_1,\ldots,i_K$ in $1,\ldots,n$ where $1 \leqslant K \leqslant n$.

$$\| f_{i_1} \oplus \cdots \oplus f_{i_k} \| = 2^{n-1}.$$

Proof. The necessity of the theorem is proved first. For any k different numbers, $i_1, \cdots, i_k$ where $1 \leqslant K \leqslant n$, we get the following from Lemma 1 and Lemma 2.

$$\| f_{i_1} \oplus \cdots \oplus f_{i_K} \| = \sum_{\substack{a_1,\cdots,a_K\in\{0,1\} \\ a_1\oplus\cdots\oplus a_K=1}} \| f_{i_1}^{a_1}\cdots f_{i_K}^{a_K} \| = \sum_{\substack{1<i<K \\ i \text{ is odd}}} C_K^i 2^{n-K} = 2^{n-1}$$

The sufficiency is proved next. Let us prove a conclusion first. When the theorem is valid, for any m different numbers $i_1, \quad i_m$ in $1,\cdots,n$ and any $a_1, \cdots, a_m \in \{0, 1\}$, $1 \leqslant m \leqslant n$, we get

$$\| f_{i_1}^{a_1}\cdots f_{i_m}^{a_m} \| = 2^{n-m}.$$

We will prove this conclusion by induction. When m = 1, the conclusion is valid from the theorem. Assuming it is valid when m = k-1 and not valid when m = k, then there are $i_1, \cdots, i_K \in \{1, \cdots, n\}$, $a_1, \cdots, a_K \in \{0, 1\}$, to make

$$\|f_{i_1}^{a_1}\cdots f_{i_K}^{a_K}\|>2^{n-K}$$

If $a_1\oplus\cdots\oplus a_K = 1$, then for any $b_1, \cdots, b_K\in\{0, 1\}$, as long as $b_1\oplus\cdots\oplus b_K = 1$ we get

$$\|f_{i_1}^{b_1}\cdots f_{i_K}^{b_K}\|>2^{n-K}$$

To generalize it, we can assume that $b_1=\bar{a}_1, \cdots, b_{2r}=\bar{a}_{2r}, b_{2r+1}=a_{2r+1}, \cdots, b_K=a_K$. Because

$$\|f_{i_1}^{a_1}\cdots f_{i_K}^{a_K}\|=\|f_{i_1}^{a_1}f_{i_2}^{a_2}\cdots f_{i_K}^{a_K}\|+\|f_{i_1}^{\bar{a}_1}\cdot f_{i_2}^{a_2}\cdots f_{i_K}^{a_K}\|=2^{n-K+1}$$

therefore

$$\|f_{i_1}^{\bar{a}_1}f_{i_2}^{a_2}\cdots f_{i_K}^{a_K}\|<2^{n-K}.$$

Also because

$$\|f_{i_1}^{\bar{a}_1}f_{i_2}^{a_2}\cdots f_{i_K}^{a_K}\|=\|f_{i_1}^{\bar{a}_1}f_{i_2}^{a_2}\cdots f_{i_K}^{a_K}\|+\|f_{i_1}^{\bar{a}_1}f_{i_2}^{\bar{a}_2}f_{i_3}^{a_3}\cdots f_{i_K}^{a_K}\|=2^{n-K+1}$$

therefore

$$\|f_{i_1}^{\bar{a}_1}f_{i_2}^{\bar{a}_2}f_{i_3}^{a_3}\cdots f_{i_K}^{a_K}\|>2^{n-K}.$$

In analogy, we can prove that when $b_1\oplus\cdots\oplus b_K=1$

$$\|f_{i_1}^{b_1}\cdots f_{i_K}^{b_K}\|>2^{n-K}.$$

From Lemma 2, we get

$$\|f_{i_1}\oplus\cdots\oplus f_{i_K}\|=\sum_{\substack{a_1,\cdots,a_K\in\{0,1\}\\ a_1\oplus\cdots\oplus a_K=1}}\|f_{i_1}^{a_1}\cdots f_{i_K}^{a_K}\|>2^{n-1}$$

It is contradictory to the theorem. Similarly, we can also prove that $\|f_{i_1}\oplus\cdots\oplus f_{i_K}\|<2^{n-1}$, when $a_1\oplus\cdots\oplus a_K = 0$ also contradicts the theorem. Therefore, the theorem is proven. When m = n, based on the proven conclusion, $\|F\ Y\| = 1$ for an arbitrary $Y\in Z_{2,n}$. Furthermore, we know that the inverse of F exists from Lemma 1. Consequently, the theorem is proven to be sufficient.

Deduction 1. When F is the reversible Boolean transform from Z_2,n to Z_2,n, then for any $a_1, \cdots, a_n\in\{0,1\}$, when $a_1, \cdots a_n$ are not all zero we get

$$\|a_1f_1\oplus\cdots\oplus a_nf_n\|=2^{n-1}.$$

If we limit f to two operations $\cap$ (denoted as .) and $\oplus$, then f can be considered as an n-variable polynomial on GF(2). $F = (f_1, \cdots, f_n)$ is the Boolean transform form Z_2,n to Z_2,n. If there is a K and $1\leqslant K\leqslant n$, and the order of f_i is smaller or equal to K and $1\leqslant i\leqslant n$, then F can be called the Boolean transform

of the Kth order from Z_2,n to Z_2,n. The Boolean public key used for the Kth order Boolean transformation is called the Kth order Boolean public key. If the set of all the Kth Boolean public keys from Z_2,n to Z_2,n is expressed as $\mathfrak{B}[K]$, we have the following theorem.

Theorem 2. $\mathfrak{B}[1]\subset\mathfrak{B}[2]\subset\cdots\subset\mathfrak{B}[n-1]=\mathfrak{B}[n]$。

Proof. According to the above definition, it is obvious that

$$\mathfrak{B}[1]\subseteq\mathfrak{B}[2]\subseteq\cdots\subseteq\mathfrak{B}[n-1]\subseteq\mathfrak{B}[n]。$$

Let's assume that $F=(f_1, \cdots, f_n)$ is the Boolean transform from Z_2,n to Z_2,n where $f_i=x_i$, $i=1, \cdots, n-1$

$$f_n=x_n\oplus x_1x_2\cdots x_K,\ 2\leqslant K\leqslant n-1。$$

Apparently the inverse of F exists. Furthermore, F is a Kth order Boolean transform.

If $x_n\oplus x_1x_2\cdots x_K\equiv h(x_1, \cdots, x_n)$, where h is a (K-1)th order Boolean function, then

$$x_1\cdots x_K\equiv x_n\oplus h(x_1, \cdots, x_n)=h'(x_1, \cdots, x_n)$$

Then, there is $a_{K+1}, \cdots, a_n\in\{0, 1\}$, which makes

$$x_1\cdots x_K\equiv h'(x_1, \cdots, x_K, a_{K+1}, \cdots, a_n)$$

$$\equiv h''(x_1, \cdots, x_K)$$

h" is still of the (K-1)th order, h" can be considered as a K-variable Boolean function. Because $h''\not\equiv 0$, therefore

$$\|h''(x_1, \cdots, x_K)\|\geqslant 2$$

Because $\|x_1\cdots x_K\| = 1$, we get

$$x_n\oplus x_1\cdots x_K\not\equiv h(x_1, \cdots, x_n)$$

Consequently, F is a Kth order Boolean transform instead of a (K-1)th order one. Hence, we can derive the following

$$\mathfrak{B}[1]\subset\mathfrak{B}[2]\subset\cdots\subset\mathfrak{B}[n-1]。$$

If F is a nth order Boolean transform, from Theorem 1 the existence of an inverse for F can assure $\|f_i\| = 2^{n-1}$ for $1\leqslant i\leqslant n$. We can easily convert each f_i to the (n-1)th order using an appropriate pair matching method. Hence, we get $\mathfrak{B}[n-1]=\mathfrak{B}[n]$。

III. Boolean Public Key of the Second Order

Assuming F is the Boolean transform from Z_2,n to Z_2,n with an existing inverse then F can be used as a Boolean public key. When the known content is $X \in Z_2,n$, we can obtain the coded content Y = F(X). However, when the secret key G is not known, decoding the coded document Y to obtain the original text is equivalent to solving the following set of equations:

$$\begin{cases} f_1(x_1, \cdots, x_n) = y_1 \\ \cdot \\ \cdot \\ \cdot \\ f_n(x_1, \cdots, x_n) = y_n \end{cases}$$

Theorem 3. Whether a n-variable second order equation set in GF(2) has a solution is a complete NP problem.

Proof. Obviously, the determination of a solution to an n-variable second order equation set in GF(2) is a NP problem. Next, we know that it is a NP completion problem, i.e., to determine whether

$$(x_{i_1}^{a_1} \cup x_{i_2}^{a_2} \cup x_{i_3}^{a_3}) \cap \cdots \cap (x_{i_{3r-2}}^{a_{3r-2}} \cup x_{i_{3r-1}}^{a_{3r-1}} \cup x_{i_{3r}}^{a_{3r}}) = 1$$
$$a_j \in \{0, 1\},\ i_j \in \{1, \cdots, n\},\ 1 \leqslant j \leqslant 3r$$

has a solution. Because

$$x_1 \cup x_2 \cup x_3 = x_1 \oplus \bar{x}_1 x_2 \oplus \bar{x}_1 \bar{x}_2 x_3$$

Theorem 3 can be converted into the determination of the solution to the following set of second order Boolean equations in GF(2):

$$\begin{cases} x_{i_1}^{a_1} \oplus x_{i_1}^{\bar{a}_1} x_{i_2}^{a_2} \oplus x_{i_1}^{a_1} x_{n+1} = 1 \\ x_{n+1} \oplus x_{i_2}^{\bar{a}_2} x_{i_3}^{a_3} = 0 \\ \vdots \\ x_{i_{3r-2}}^{a_{3r-2}} \oplus x_{i_{3r-2}}^{\bar{a}_{3r-2}} x_{i_{3r-1}}^{a_{3r-1}} \oplus x_{i_{3r-2}}^{\bar{a}_{3r-2}} x_{n+r} = 1 \\ x_{n+r} \oplus x_{i_{3r-1}}^{\bar{a}_{3r-1}} x_{i_{3r}}^{a_{3r}} = 0 \end{cases}$$

Because whether Theorem 3 is satisfied can be converted to the determination of a solution to a second order equation set on GF(2) by way of a time polynomial, therefore, it is proven that whether a solution to a series of second order equations in GF(2) exists is a complete NP problem.

For a series of second order equations in GF(2), although the solution determination problem is different from the solution finding problem, yet they are closely related. Just as the trap door knapsack problem, we can understand the difficulty in solution finding from that in solution determination. Hence, it is a very difficult problem to solve the document X from the code Y when the secret key G is not known.

Assuming A is a nxn non-singular matrix in GF(2), then the Boolean transform from $Z_{2,n}$ to $Z_{2,n}$ $F=(f_1,\cdots, f_n)$

$$f_i=\sum_{j=1\to n}^{\oplus} a_{ij}x_j$$

is called a linear Boolean transformation using A as the transformation matrix. If A^{-1} is the inverse of A, then the linear Boolean transformation G using A^{-1} as the transformation matrix is the reverse transformation of F.

Theorem 4. If A and B are the linear Boolean transform from $Z_{2,n}$ to $Z_{2,n}$ and F is the Kth order Boolean transform from $Z_{2,n}$ to $Z_{2,n}$, then A.F.B is still a Kth order Boolean transfer from $Z_{2,n}$ to $Z_{2,n}$.

Proof. If $h_1, h_2,\cdots,h_{n-1}$ are the n-1, n-2, $\cdots$,1 variable second order Boolean function, respectively, then the Boolean transform from $Z_{2,n}$ to $Z_{2,n}$ is F = $(f_1,\cdots, f_n)$, where

$$\begin{aligned} f_1&=x_1\oplus h_1(x_2,\cdots,x_n)\\ f_2&=x_2\oplus h_2(x_3,\cdots,x_n)\\ &\vdots\\ f_{n-1}&=x_{n-1}\oplus h_{n-1}(x_n)\\ f_n&=x_n \end{aligned}$$

F is the Boolean transform from $Z_{2,n}$ to $Z_{2,n}$ with an inverse. The reverse transformation of F is G:

$$G=G_1\cdot G_2\cdots G_{n-1},$$

where $G_i=(x_1,\cdots,x_{i-1}, x_i\oplus h_i(x_{i+1},\cdots,x_n),x_{i+1},\cdots,x_n)$.

If A and B are the linear Boolean transforms from $Z_{2,n}$ to $Z_{2,n}$, then A^{-1} and B^{-1} are their respective transforms. From Theorem 3 we know that A·F·B is also a second order Boolean transform from $Z_{2,n}$ to $Z_{2,n}$. Furthermore, its inverse is $B^{-1}\cdot G\cdot A^{-1}$. For this F, we may create a second order Boolean public key by choosing different A and B.

For example, when n = 6, we choose

$$A=\begin{pmatrix} 0&1&1&0&0&1\\ 1&0&0&1&0&0\\ 0&1&0&0&1&0\\ 1&0&1&0&1&0\\ 0&1&0&1&1&0\\ 1&1&0&0&0&1 \end{pmatrix} \quad A^{-1}=\begin{pmatrix} 0&1&1&0&1&0\\ 1&0&1&1&0&1\\ 1&1&1&0&1&1\\ 0&0&1&0&1&0\\ 1&0&0&1&0&1\\ 1&1&0&1&1&0 \end{pmatrix}$$

$$B=\begin{pmatrix}1&1&0&0&0&0\\0&1&1&0&0&0\\0&0&1&1&0&0\\0&0&0&1&1&0\\0&0&0&0&1&1\\1&1&0&0&0&1\end{pmatrix}\quad B^{-1}=\begin{pmatrix}0&1&1&1&1&1\\1&1&1&1&1&1\\1&0&1&1&1&1\\1&0&0&1&1&1\\1&0&0&0&1&1\\1&0&0&0&0&1\end{pmatrix}$$

$$F=(f_1,\ f_2,\cdots,f_6)$$

$$f_1=x_1\oplus(x_2\bar{x}_3\oplus x_2x_4\oplus x_3\bar{x}_5\oplus\bar{x}_4x_6)$$

$$f_2=x_2\oplus(x_3x_4\oplus x_3x_5\oplus x_4x_6)$$

$$f_3=x_3\oplus(\bar{x}_4x_5\oplus x_5x_6)$$

$$f_4=x_4\oplus x_5\bar{x}_6$$

$$f_5=x_6\oplus\bar{x}_6$$

$$f_6=x_6$$

$$P=A\cdot F\cdot B,\ P=(p_1,\cdots,p_6)$$

$$P_1=x_1\bar{x}_6\oplus x_3\bar{x}_4\oplus x_3\bar{x}_6\oplus\bar{x}_1x_4\oplus x_2x_4\oplus x_5x_6\oplus x_4\bar{x}_5\oplus\bar{x}_4x_6\oplus x_2x_6$$

$$P_2=\bar{x}_2x_3\oplus x_1\bar{x}_4\oplus x_2\bar{x}_4\oplus x_3x_6\oplus x_4x_5\oplus x_2x_5\oplus x_1\bar{x}_6\oplus\bar{x}_2x_6$$

$$P_3=x_3x_4\oplus x_3\bar{x}_6\oplus\bar{x}_1x_4\oplus x_2\bar{x}_4\oplus\bar{x}_1\bar{x}_5\oplus x_2\bar{x}_5\oplus\bar{x}_5x_6$$

$$P_4=\bar{x}_2x_3\oplus x_1\bar{x}_4\oplus x_2\bar{x}_4\oplus x_3\bar{x}_6\oplus\bar{x}_5x_6\oplus x_4x_6\oplus x_2x_5\oplus x_1\bar{x}_6\oplus x_2x_6$$

$$P_5=x_3x_4\oplus\bar{x}_3\bar{x}_6\oplus\bar{x}_1\bar{x}_4\oplus\bar{x}_2x_4\oplus\bar{x}_1x_6\oplus x_2x_6\oplus x_5x_6\oplus\bar{x}_5\bar{x}_6$$

$$P_6=\bar{x}_1\bar{x}_5\oplus x_2x_3\oplus x_4\bar{x}_5\oplus\bar{x}_3x_4\oplus x_1x_5\oplus\bar{x}_2\bar{x}_5$$

When $X=(0,\ 0,\ 0,\ 1,\ 0,\ 0)$, $Y=P(X)=(0,\ 0,\ 0,\ 1,\ 1,\ 0)$.

When such a Boolean public key from $Z_{2,n}$ to $Z_{2,n}$ is created, if the n selected is large (e.g., n = 64), it has the capability to resist frequency analysis and exhaustive testing. Furthermore, from the above theorem we know that a time polynomial method does not exist for solving a series of second order equations on GF(2). Therefore, it is a very difficult problem to break the code when the reverse transformation is not known. The key to ensuring the security of a second order Boolean public key is that the secret key is very difficult to crack, i.e., the public key is unidirectional. With regard to this question, we have the following discussion.

Theorem 5. F is a reversible Boolean transform from $Z_{2,n}$ to $Z_{2,n}$. For any reversible linear transform A from $Z_{2,n}$ to $Z_{2,n}$, there is a linear transform A' to make

$$F\cdot A=A'\cdot F$$

Then F must be a linear Boolean transform.

Proof. Because $F=(f_1,\cdots,f_n)$ is a reversible Boolean transform from $Z_{2,n}$ to $Z_{2,n}$, from Lemma 1, as long as $a_1=a_2=\cdots=a_n=0$ does not exist for $a_1,\cdots,a_n\in\{0,\ 1\}$; we get

$$\|a_1 f_1 \oplus \cdots \oplus a_n f_n\| = 2^{n-1}.$$

If $A=(x_1 \oplus x_j, x_2, \cdots, x_n)$, $2 \leqslant j \leqslant n$, then A is the reversible linear Boolean transform from $Z_{2,n}$ to $Z_{2,n}$. From the theorem, there is a linear Boolean transform A

$$F \cdot A = A' \cdot F$$

If we express f_i as the following

$$f_i(x_1, \cdots, x_n) = x_1 g_1(x_2, \cdots, x_n) \oplus \bar{x}_1 g_2(x_2, \cdots, x_n) \oplus g_3(x_2, \cdots, x_n)$$

We can obtain the following

$$(x_1 \oplus x_j) g_1 \oplus (\bar{x}_1 \oplus x_j) g_2 \oplus g_3 = a'_{i1} f_1 \oplus \cdots \oplus a'_{in} f_n$$
$$x_j (g_1 \oplus g_2) = a'_{i1} f_1 \oplus \cdots \oplus (1 + a'_{ij}) f_j \oplus \cdots \oplus a'_{in} f_n$$

If $x_j(g_1 \oplus g_2) \equiv 0$, then $g_1 \equiv g_2$, then

$$f_i(x_1, \cdots, x_n) = g_1(x_2, \cdots, x_n) \oplus g_3(x_2, \cdots, x_n)$$

If $x_j(g_1 \oplus g_2) \not\equiv 0$, from Lemma 1 we get

$$\|x_j(g_1 \oplus g_2)\| = 2^{n-1}, \quad 2 \leqslant j \leqslant n,$$

i.e., $g_1 \oplus g_2 \equiv 1$. Therefore, $g_1 \equiv \bar{g}_2$. Consequently

$$f_i(x_1, \cdots, x_n) = x_1 g_1 \oplus \bar{x}_1 \bar{g}_1 \oplus g_3 = x_1 \oplus \bar{g}_1 \oplus g_3$$

In analogy, we can obtain

$$f_i(x_1, \cdots, x_n) = b_{i1} x_1 \oplus \cdots \oplus b_{in} x_n \oplus c_i$$

$$b_{ij}, c_i \in \{0, 1\}, \quad 1 \leqslant i \cdot j \leqslant n$$

Because F is a reversible Boolean transform, we know that $B=(f_1 \oplus c_1, \cdots, f_n \oplus c_n)$, $c_1, \cdots, c_n \in \{0,1\}$ is also a Boolean transform with an inverse. Furthermore, B is also a linear Boolean transform.

If we assume $P=(x_1 \oplus c_1, \cdots, x_n \oplus c_n)$, then $F = P \cdot B$. P is the reversible Boolean transform from $Z_{2,n}$ to $Z_{2,n}$. For any reversible Boolean transform A from $Z_{2,n}$ to $Z_{2,n}$

$$P \cdot A = P \cdot B \cdot B^{-1} \cdot A \cdot B \cdot B^{-1} = F \cdot B^{-1} \cdot A \cdot B \cdot B^{-1}$$

From the theorem, there is a linear transform A' which satisfies

$$F \cdot B^{-1} \cdot A \cdot B = A' \cdot F$$

Therefore

$$P \cdot A = A' \cdot F \cdot B^{-1} = A' \cdot P$$

Let us discuss the situation in the following three cases:

(1) If $c_1=c_2=\cdots=c_n=0$, then P is a linear Boolean transform. Consequently, $F=P\cdot B$ is also a Boolean transform. Hence the theorem is proved.

(2) If some of the $c_1,\cdots,c_n$ are 1 and some are 0, let us assume that $c_1=1$, $c_2=0$, and $A=(x_2,x_1,x_3,\cdots,x_n)$, then there is a linear Boolean transform A' which satisfies the following

$$P\cdot A = A'\cdot P$$

Then

$$x_2\oplus c_1=a'_{11}(x_1\oplus c_1)\oplus a'_{12}(x_2\oplus c_2)\oplus\cdots\oplus a'_{1n}(x_n\oplus c_n)$$
$$1=a'_{11}(x_1\oplus c_1)\oplus(a'_{12}\oplus 1)(x_2\oplus c_2)\oplus\cdots\oplus a'_{1n}(x_n\oplus c_n)$$

It contradicts deduction 1 and this case will not happen.

(3) If $c_1=c_2=\cdots=c_n=1$, when $A=(x_1\oplus x_2,x_2,\cdots,x_n)$, there is a linear Boolean transform A' which satisfies

$$P\cdot A=A'\cdot P$$
$$\bar{x}_1\oplus x_2=a'_{11}\bar{x}_1\oplus a'_{12}\bar{x}_2\oplus\cdots\oplus a'_{1n}\bar{x}_n,$$
$$1=(a'_{11}\oplus 1)\bar{x}_1\oplus(a'_{12}\oplus 1)\bar{x}_2\oplus\cdots\oplus a'_{1n}\bar{x}_n,$$

Again, it contradicts deduction 1 and will not happen. In summary, F can only be a linear Boolean transform.

Deduction 2. F is a reversible Boolean transform from $Z_{2,n}$ to $Z_{2,n}$. If A is one arbitrary reversible linear Boolean transform and there is a linear Boolean transform A' which satisfies

$$A\cdot F = F\cdot A'$$

then, F is also a linear Boolean transform.

Proof. For an arbitrary reversible linear Boolean transform A, there is a linear reversible Boolean transform A' which satisfies

$$A\cdot F = F\cdot A'$$

Furthermore, for reversible Boolean transforms A and A' if

$$A\cdot F=A''\cdot F=F\cdot A'$$

then

$$A\cdot F\cdot F^{-1}=A=A''\cdot F\cdot F^{-1}=A''$$

Subsequently, we can establish the fact that the reversible linear Boolean transform set from $Z_{2,n}$ to $Z_{2,n}$ corresponds to itself one to one. Therefore, for an reversible Boolean transform A', there is always a linear Boolean transform A so that

$$F \cdot A = A' \cdot F$$

From Theorem 4 one knows that F is a linear Boolean transform.

From Theorem 4 and Deduction 2 one knows that when a Boolean public key is created in the form of A·F·B it cannot be converted to the F·A' or A'·F form because F is usually not chosen as a linear Boolean transform. Thus, it creates some difficulty in solving the secret key from the public key.

The inverse of a second order Boolean transform is not necessarily a second order Boolean transform. For example, in the second order Boolean transform introduced above $F = (x_1 \oplus h_1(x_2,\cdots,x_n),\cdots,x_{n-1}\oplus h_{n-1}(x_n),x_n)$, $h_1,\cdots,h_{n-1}$ are second order Boolean functions. Its inverse $G=(g_1,\cdots,g_n)$, where

$$g_n = y_n$$
$$g_{n-1} = y_{n-1} \oplus h_{n-1}(y_n)$$
$$g_{n-2} = y_{n-2} \oplus h_{n-2}(y_{n-1} \oplus h_{n-1}(y_n),\ y_n)$$
$$g_{n-3} = y_{n-3} \oplus h_{n-3}(y_{n-2} \oplus h_{n-2}(y_{n-1} \oplus h_{n-1}(y_n), y_n), y_{n-1} \oplus h_{n-1}(y_n),\ y_n)$$
$$\vdots$$

As long as $h_1,\cdots,h_{n-1}$ are properly chosen, G is usually not a second order Boolean transform. If a second order Boolean public key is created in the A.F.B form and F is suitably chosen, the Boolean expression of the components of its inverse $B^{-1}\cdot F^{-1}\cdot A^{-1}$ will be too long to write. Therefore, it will be very difficult to find the code from such a second order Boolean public key.

Another way to break such a second order Boolean public key in the form of A·F·B is to find these three transforms A,F, and B from the public key P. Usually we can only assume that A·B is a matrix with n^2 unknowns and write a general expression for F with unknown elements:

$$A \cdot F \cdot B = P$$

to list a series of second order equations on GF(2). However, we realize that it is difficult to solve a series of equations on GF(2). Hence it is very hard to break the code this way.

Similar to other public key systems such as the RSA system and the trap door knapsack problem, the second order Boolean public key also has an implementation problem. For instance, a second order Boolean public key from $Z_{2,n}$ to $Z_{2,n}$ usually has over 1,000 second order terms in the Boolean expression of a component of the public key F. The entire public key could be around 64,000 terms. If we present the public key as a program and build a special Boolean

operator, we will be able to encode 20,000 bits per second at the present level. It is much faster than the RSA system which can encode several thousand bits per second.

In conclusion, with regard to security and execution speed, the second order Boolean public key is a promising new public key cryptosystem.

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PEOPLE'S REPUBLIC OF CHINA

A VW-83 PORTABLE BROADBAND VLF RECEIVER

Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese No 4 Jul 84 pp 110-111

[Article* by Xu Jisheng [1776 4949 3932] and Bao Zongti [0202 1350 1879] of Wuhan University]

[Abstract] A portable broadband VLF receiver with 56 cm air-core look antenna and automatic real-time calibration has been developed. The system sensitivity is 1.4 x 10^{-8} V/m·$Hz^{1/2}$ (at f=5 kHz), and the bandwidth is from 250 Hz to 48 kHz. The simultaneous observations at a number of field stations show that the performance of this system is stable.

[Text] We have successively developed two sets of equipment for the reception of whistle signals.(1) These have yielded abundant data on whistles when used at low latitude stations.(2) This portable VLF receiver is designed for multi-station use in an electric wave observing net. Their simultaneous contrasting observations of the amplitude of ground whistles demonstrated this receiver has made improvements in the following areas:

1. In recent years whistle receivers used in domestic research have generally employed loop antennas which cover a very large area (several hundred square meters). Our design uses an area of only 0.3 m^2 for its small-scale shielded antenna. In addition, the receiver employs integrated circuitry, thereby achieving small scale and portability.

2. In order to attain the optimum match of bandwidth and sensitivity, the design calls for a transformer coupled field effect grounded-gate differential input circuit. This is clearly an improvement in overall receiver frequency response, as well as in system sensitivity and interference rejection to some extent.

3. The receiver is equipped with a timer circuit linked with an automated real-time gain calibration circuit. This overcomes the shortcomings we find in some receivers' performance or real-time work conditions, as well as the

* A study funded by the Chinese Academy of Sciences. Paper was received in November 1983.

difficulties that accompany analysis of simultaneous observations or directional data received from a number of field stations.

The principle design features of the receiver are as follows:

1. System frequency response

Frequency response is the major objective of the built-in antenna in a wide band VLF receiver. Whistle signals from natural sources maintain a basically constant power spectral density at 300 Hz to 30 kHz. In order to research their characteristic frequency spectrum it is necessary for the receiver to have an even response over the useful frequency range (300 Hz to 30 kHz). Because the loop antenna's induced signal voltage is in direct ratio to the frequency, the same signal voltage induced by an incidental wave field can vary at each end of the useful frequency band by as much as 40 dB. Besides this, in the usual design model, the coupling transformer's distributed capacitance within the useful frequency band causes the input return circuit to resonate.[3] This makes it difficult to maintain an even frequency response in the system. In order to balance the antenna's characteristic frequency response and eliminate the unfavorable influence of the coupling transformer's distributed capacitance, we designed the transformer-coupled, field effect, grounded-gate, differential input circuit. Test measurements indicate that the adoption of this input circuit can result in a more satisfactory frequency response.

2. System sensitivity

The key to increasing system sensitivity lies in the design of the input circuit. Although the coupling transformer can induce some undesirable effects in the input circuit's noise performance, still an appropriate design can minimize these. Moreover, the use of the coupling transformer can permit an optimum match between the input circuit's input impedance and the antenna impedance on one hand, and the bandwidth and sensitivty on the other. It can also be useful in suppression of outside noise. To reduce receiver noise, the input stage and the second stage both use a junction field effect transistor with good low frequency noise performance. It is worth noting that the noise performance of field effect transistors is related to transconductance,[4] and therefore requires a careful adjustment of the quiescent work current to the field effect transistor in the input stage.

3. Anti-interference capability

Some frequently noted types of interference and the methods of suppressing them: (1) Transmission line and electrical machinery interference. This type of interference can be suppressed by selecting a site remote from transmission lines or machinery, by utilizing the directional characteristic of loop antennas, and in some situations by building into the receiver a high pass filter with a 1 kHz cutoff frequency. (2) Man-made VLF transmission interference. This type of interference, chiefly found between 10 kHz and 14 kHz, can be reduced by using a low pass filter with a 10 kHz cutoff frequency.

(3) High frequency interference. This type of interference is in most cases produced by the transmissions of radio broadcasting stations. If the antenna, feeder line and coupling transformer are in strict symmetrical balance, the use of a static electrical screen can make the receiver free of high frequency interference. Moreover, wide band VLF receivers require a dynamic range sufficient to permit examination of weak signals without overloading the receiver with strong signals. The dynamic range of this receiver is approximately 100 dB per unit, and in actual observations there has been no occurrence of overloading.

Figure 1 is a photograph of the receiver's external appearance, and Figure 2 is a flow chart of its principle stages. It employs a specially-designed, multi-turn, square-shaped receiving antenna, having an area of 0.31 m^2 and using 44 turns of 1 mm diameter cotton-covered wire. The antenna is set in a wooden frame, and shielded all around with copper foil. The antenna's resistance is 2.15 ohms, its inductance is 3.97 mH, its turning frequency is 86 Hz, and its normalized sensitivity is 6.27×10^{-4} $V \cdot Hz^{1/2}/m$.

When used in conjunction with a digital control terminal, this receiver can serve as a VLF direction finder.

Completely assembled, the received weighs approximately 4 kg. Its main performance parameters are as follows:

System sensitivity: (f=5 kHz): 1.4×10^{-6} $V/m \cdot Hz^{1/2}$

System calibration gain: a. 20 dB; b. 39 dB; c. 59.3 dB

System bandwidth: a. 250 kHz-48 kHz; b. 1 kHz-48 kHz; c. 1 kHz-10 kHz

Maximum non-distorting input voltage (effective value): 6 V

Internal calibration signal frequency: 4 kHz

Internal calibration injector current: 5.0×10^{-8} A

Testing and actual field observations have demonstrated that this receiving equipment conforms to design specifications and its performance is stable. The performance indexes of its major techniques are comparable to that of current international receiving equipment of the same class (e.g., the 1980-model VLF portable receiver of Stanford University in the United States).

Comrades Yan Chenggao [0917 2052 7559], Tian Mao [3944 5399], Tang Cunchen [0781 1317 3819] and Shi Jianping [4258 1696 1627] provided assistance in the installation and debugging of this equipment. We express our gratitude to them here.

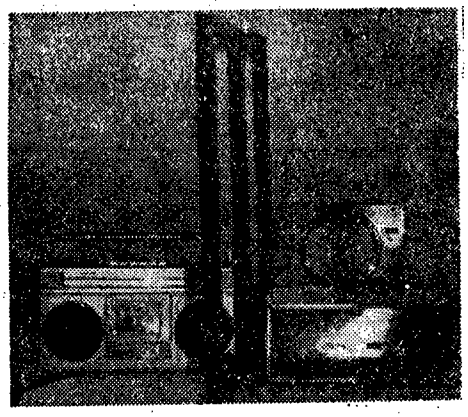

Figure 1

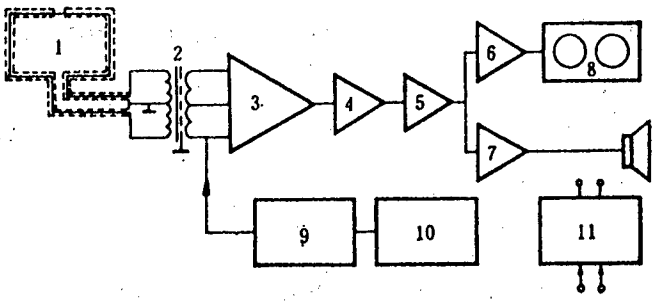

Figure 2: Overall receiver flow chart

Key:

1. Antenna
2. Transformer
3. Preamplifier
4. Variable band-pass filter
5. Variable gain filter
6. Input circuit amplifier
7. Power amplifier
8. Tape recorder
9. 9.5 kHz fixed signal generator
10. Automatic calibration control
11. Stable power source

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PEOPLE'S REPUBLIC OF CHINA

BRIEFS

PHONE EXCHANGES FROM ERICSSON--Ericsson recently received four orders for a total of about 160 million kronor to deliver AXE telephone exchanges to four cities in China. This means that China has ordered more than 100,000 AXE lines. The AXE system has been operating in China since last year. [Text] [Stockholm DAGENS NYHETER in Swedish 5 Mar 85 p 10] 9336

CSO: 5500/2599

BRIEFS

TANJUG-ANGOP AGREEMENT--Belgrade, 1 Mar (TANJUG)--An agreement on cooperation between the YUGOSLAV NEWS AGENCY TANJUG and the ANGOLAN NEWS AGENCY ANGOP was signed today in Belgrade by the two agencies directors Mihailo Saranovic and Raimundo Sotto Mayor. The agreement envisages exchanges of the two news agencies services with the aim of inclusion in the two countries communications media, as well as in TANJUG and ANGOP services for other countries. The agreement also sets down terms for the training of personnel there. Good results have already been recorded so far. Cooperation within the nonaligned news agencies poll was also agreed on. The ANGOP director is in Belgrade at the Nonaligned News Agencies Pool coordinating committee session. The two news agencies also reached an agreement on cooperation in reporting from the nonaligned ministerial conference next September in Luanda. [Text] [Belgrade TANJUG in English 1718 GMT 1 Mar 85 LD]

QATAR NEWS AGENCY-TANJUG AGREEMENT--Belgrade, 5 Mar (QNA)---QATAR NEWS AGENCY and YUGOSLAV NEWS AGENCY TANJUG Tuesday signed a news exchange agreement and a new duplex line will open soon to transmit QATAR NEWS AGENCY Asian and Pacific news through the YUGOSLAV NEWS AGENCY. QNA Assistant Director (Ahmed Jassim al-Hamar) [spelling as received] signed the agreement on behalf of Qatar and director of TANJUG Mihailo Sarunovic signed for his side. TANJUG is considered one of the major news gathering points for the Non-Aligned News Agencies Pool QATAR NEWS AGENCY is one of the few Arab news agencies which casts its news wire service via satellite. [Text] [Belgrade TANJUG in English 1940 GMT 5 Mar 85 LD]

CSO: 5500/3017

BANGLADESH

REGIONAL SEMINAR ON TELECOMMUNICATIONS OPENS

Dhaka THE NEW NATION in English 26 Feb 85 pp 1, 8

[Text] Three-day SARC seminar on telecommunication network began in the city yesterday with the objective to develop closer cooperation in telecommunication sector in the region.

The seminar, an outcome of the combined efforts of the Ministry of Foreign Affairs, Post and Telecommunication Division of the Ministry of Communications and the T&T Board, is being held in a spirit of collective efforts to develop, and expand the telecommunication facilities and boost liberal trade in the field of telecommunication equipment and cables among the SARC countries.

About 65 participants and observers from India, Pakistan, Sri Lanka, Nepal and Bangladesh are participating in the seminar which is expected to make some important recommendations.

Inaugurating the seminar, Secretary for Cabinet Division Mr M. Mahbubuzzaman hoped that the deliberations of the seminar would help in cross fertilization of experience and exploring possibilities of cooperation in technology transfer among the SARC countries.

Mr Mahbubuzzaman said Bangladesh attached great importance to the South Asian Regional Cooperation and earnestly believed that it should be conducive to the creation of an atmosbphere of peace, amity and understanding in the region. He said cooperation and exchange of knowledge among the countries would go a long way towards meeting the basic needs like food, clothing, shelter education and medicare in addition to telecommunication.

The Cabinet Secretary also pointed out that pooling of the resources and technical knowhow of the SARC countries under an institutional framework for the betterment of the lot in the region could be an aspect during the deliberations in the seminar.

In his address of welcome Chairman of Bangladesh T&T Board Kazi Abdur Rouf narrated the background of the seminar on telecommunication network and said improvement of national telecommunication network and establishment and expansion of international network, particularly within the member countries, are the means by which the fostering of better cooperation and culmination of social bondage among the people of the SARC countries could be improved to a great extent. At the same time it would provide for necessary infrastructure towards the development of trade, commerce and other economic activities among the countries of the region, he said.

Giving a brief account of the present telecommunication facilities in Bangladesh and with other countries Mr. Rouf said Bangladesh had given special emphasis on the digitalisation of the telecommunication system.

CSO: 5550/0039

OFFICIALS MEET WITH PRC RADIO, TELEVISION DELEGATION

Dhaka THE BANGLADESH TIMES in English 13 Feb 85 p 1

[Text] The visiting six-member Chinese radio and TV delegation led by Vice-Minister Mr Ma Qingxiong called on the Minister for Information, Law and Civil Aviation, Barrister A.R. Yusuf at his office on Tuesday, reports BSS.

During hour-long meeting, matters relating to further promotion of cooperation between Bangladesh and China in the fields of radio and television through mutual exchange of programme and frequent exchange of cultural and other delegations were discussed.

The Information Minister hoped that the scope and area of the existing cultural agreement between the two countries would be enlarged through exchange of cultural programmes including music and dance. Barrister Yusuf suggested broadcasting Chinese programme in Bangladesh Television and our programme in Chinese television to bring the two peoples closer.

Barrister Yusuf said that the policy of President Ershad is to further improve relations with China on broader basis to enable Bangladesh and China to work together for the welfare of the Third World countries.

Referring to the deep attachment of the people and government of Bangladesh for the Chinese brethren, Barrister Yusuf observed, due to President Ershad's personal initiative the friendship has deepened in the successive years. Bangladesh has now very good relation with China, he added. He hoped that this visit of the Chinese delegation would help at further consolidating the existing friendly ties between the two countries.

The Chinese delegation leader, reciprocating the same sentiments, expressed the hope that a high level TV, radio and press delegation from Bangladesh would soon visit China. The Information Minister accepted the invitation.

The Chinese Ambassador in Bangladesh, Mr Xiao Xiang Qian, was present on the occasion.

Exchange of Programme Discussed

The exchange of radio and television programme between Bangladesh and China was discussed at a meeting between the Chinese radio and TV delegation led by Vice-Minister Mr Qingxiong and the Information Secretary, Mr Manzoor-ul-Karim at the latter's office on Tuesday.

They also discussed development of daily programme of radio and Television and frequent exchange of delegations between the two friendly countries.

Later, the Chinese delegation visited the National Broadcasting House at Sher-e-Bangla Nagar and National Museum at Shahbagh.

CSO: 5550/0038

MEDIA URGED TO PROJECT VIEWS FROM NATIONAL ANGLE

Dhaka THE NEW NATION in English 11 Feb 85 pp 1, 8

[Text]

Barrister A R Yusuf, Minister for Information, Law and Justice and Civil Aviation and Tourism on Sunday urged the media to project views on national angle, reports BSS.

The Minister was talking to the editors of national dailies and news agencies in his office.

He also underlined that the views of the Government should be projected correctly.

He assured that on broader national and sensitive issues, the Government would take the editors into confidence for forging better understanding and cooperation.

The Minister hoped that the national press would extend all cooperation to the Government during this critical period of our country and help the Government in its efforts to restore representative government. He said that he would work with the assistance and cooperation of the editors and journalists and try his utmost to resolve the problems facing the press.

The Minister said that he would meet the editors frequently and that the Bangladesh Press Consultative Committee would meet once a month. He assured that the committee set up for examination of the proposals for implementation of the recommendation of the Press Commission would be activated so that the body could submit recommendations soon.

CSO: 5550/0035

PAPERS REPORT ON SIKH BROADCAST FROM EUROPE

Reaction, Plans

New Delhi PATRIOT in English 28 Feb 85 p 7

[Text] **London, Feb 27 (PTI).**— Last-minute queries by the British Home Office did not prevent separatist Sikhs here from going ahead with the inaugural broadcasts of the so-called "Khalsa Voice" from an unknown commerical radio station in West Europe last night.

The 15-minute inaugural programme consisted of recitations from the holy Granth Sahib and a discussion on a current topic, according to the self-styled leader of the so-called Khalistan, Dr Jagjit Singh Chauhan, who said that a brief message from him was also included.

Just before it was scheduled to go on the air, British Home Office sought to obtain advance transcripts of the programme, Dr Chauhan said, adding that this had been refused because "law does not require us to comply with such demands".

The programme, sponsored by a newly-set up outfit, Radio Khalsa Voice, has cost one thousand pounds for its 15-minute duration. It will continue to be broadcast weekly for the time being and later it may be increased to two programmes a week.

Dr Chauhan said that the sponsors of the programme had declined to show the transcripts, telling Home Office officials that its contents were not political in nature and that in any case, it was not being broadcast from Britain. "We threatened to move to the High Court and ultimately they did not press for the transcript", he added.

The Indian High Commission here is believed to have drawn the British Government's attention recently to Dr Chauhan's plans to organise the broadcasts. It asked for "appropriate action" in the matter.

Dr Chauhan said that the broadcast had been made from a commercial station somewhere in France. He declined to give details.

Indian Objections

Calcutta THE TELEGRAPH in English 28 Feb 85 p 1

[Article by Ashis Ray]

[Text] **London, Feb. 27:** India is likely to protest to the Luxembourg government regarding a 15-minute broadcast over Radio Luxembourg yesterday, titled "Khalsa Voice", which included an interview with the self-styled leader of Khalistan, Dr Jagjit Singh Chauhan. The programme was reportedly sponsored by Sikhs in Britain.

According to diplomatic sources, there was nothing objectionable about the contents of the broadcast as such, but New Delhi would probably take umbrage at Dr Jagjit Singh Chauhan being introduced as "President of Khalistan."

It is expected that the Union government will ask its counterpart to take action under Luxembourg law and ban all future instalments of "Khalsa Voice." It was indicated in last evening's broadcast that the series will go on air once a week.

However, Dr Jagjit Singh Chauhan has cleverly distanced himself from the funding of the programme by only congratulating its producers for their efforts during the interview with him.

The broadcast was heard loud and clear, as Radio Luxembourg normally is in Britain, and interestingly enough, steered clear of controversy by referring, in a secular tone, to the greatness of the people of Punjab, rather than of Sikhs.

CSO: 5550/0042

DOORDASHAN CHIEF ENGINEER TELLS FUTURE PLANS

Madras THE HINDU in English 26 Feb 85 p 11

[Text] MADRAS, Feb. 25.

Doordarshan will introduce a subscriber's 'teletext' service in Delhi before 1985 end and in other metropolitan centres later.

The Chief Engineer, Doordarshan, Mr. R. S. Sastri, told a three-day southern zonal conference of engineering heads of All India Radio and TV which began here today, that messages like the arrival and departure of air and train services could be flashed through this facility. Another new introduction, also to be tried first in Delhi, would be computer graphic applications.

He said Doordarshan, which had only 20 centres in 1982, had 171 centres today. By the end of the special plan now being implemented, 180 centres would function by the year end.

Mr. Sastri said the next five to 10 years would witness considerable growth especially in the regional services, which would be given priority in the INSAT II coverage.

Doordarshan gave due importance to import substitution in equipment and spares. The satellite receiving equipment imported from the U.S., which had failed, was waiting to be repaired even during the guarantee period because of the delay in following up a complaint.

Revolution: Mr. S. P. Bhatikar, Engineer-in-Chief, All India Radio, said India was going through a communication revolution and when the on-going Sixth Plan projects were completed, 95 per cent of the population would be covered. By the end of the Seventh Plan, 98.5 per cent of the population, would be covered.

With the expanding network and sophisticated equipment, training of the staff had acquired significance, the Engineer-in-Chief said, adding that regional training centres were likely to be set up for this purpose. Recruitment of staff for manning and maintaining the new stations would also receive due priority.

Mr. Bhatikar referred to the dislocation of broadcasting services due to snapping of link lines provided by the Post and Telegraphs department and said R and D work was on to find a Pulse Code Modulation (PCD) to provide better links to the AIR studios. Computerisation and decentralisation were other areas to be pursued.

Awards for stations: Mr. O. P. Khushoo, Chief Engineer (Maintenance), announced the awards for the best AIR stations and installation projects for 1982 and 1983 in the south zone. While Bangalore and Tiruchi stations of AIR jointly shared the best station award for 1982, Tiruchi bagged it for 1983. Similarly, the Type-IV studio in Bangalore and Type-I studio in Coimbatore shared the best installation project for 1982; with the 100 kV medium transmitter project at Cuddapah taking the 1983 award.

Mr. S. Thiruvenkatachari, retired Chief Engineer AIR, gave away the awards and said AIR engineers were second to none in efficiency and integrity.

Welcoming the gathering, Mr. K. B. G. Menon, Chief Engineer (South Zone), underscored the need for a qualitative improvement in programmes and hardware. The future was in stereo broadcasting, multichannel and digital recording, he said.

The Director of Maintenance, Mr. T. V. Balakrishnan, proposed a vote of thanks. An exhibition of electronic products and broadcasting and telecasting equipment has also been arranged.

Teletext is a service through which a TV centre can utilise unused scanned lines on a television set to disseminate information of public interest, which can be stored in and recalled from a computer. A subscriber can either ring up the TV centre and ask for the information or make use of a button device to call for a particular information.

(Information such as numbers in a telephone directory, arrival and departure timings of trains, flights, bank rates, shipping news and such other details can be displayed on the screen even as a programme is on. The service introduced in countries like Britain and the U.S., on selected TV networks has proved highly beneficial to TV viewers).

CSO: 5550/0040

BRIEFS

REMOTE-SENSING CENTERS--Ahmedabad, February 27 (UNI)--Five regional remote sensing (data processing) service centres (RRSSC) being set up by the Indian Space Research Organisation (ISRO), will start operation by the first quarter of 1986. The ISRO Bangalore-based scientist, Mr V.R. Rao, who is attending a two-day symposium here on remote sensing in agriculture, sponsored by the Indian Society of Photo-Interpretation and remote sensing, Ahmedabad chapter, said the centres would have facilities of computer systems and data interpretation and they were being set up at Dehra Dun, Nagpur, Kharagpur, Bangalore and Jodhpur. Department of Space has been identified to handle these centres and subsequent ones to be set up in north and north-eastern region. Mr Rao said nine task forces to study the details in the management of different resources, such as agriculture, forestry, geology, soils and land use, urban and rural studies, water resources and oceanography had been set up. The task forces have studied the details and recognised the potentials of remote sensing technology. The other two task forces were studying details of Cartographic Representation of Data (CARD) and Natural Resources Information System (NRIS), he added. [Text] [Bombay THE TIMES OF INDIA in English 28 Feb 85 p 7]

CSO: 5550/0041

TV TRANSMITTER COMMISSIONED IN KERMAN

LD191104 Tehran Domestic Service in Persian 0430 GMT 19 Mar 85

[Excerpts] In connection with the commissioning of the first powerful television transmitter of Badr, in Kerman Province, our colleague brings you the following report:

The first powerful television transmitter of Kerman Province that was designed by the committed experts of our country in the design and expansion unit of the Voice and Vision Organization of the Islamic Republic of Iran, and was erected in the Lashkar heights, the residential estate of (Mes-e Sar Cheshmen) on the occasion of the victorious Badr operations, was named the Badr powerful television transmitter and began its operation during a ceremony in the presence of Mr Mohammad Hashemi, the managing director of the Voice and Vision Organization, at the site where this transmitter has been installed.

Mr. Hashemi, the managing director of the Voice and Vision of the Islamic Republic of Iran, in the course of some remarks, noted the great successes of the Islamic Republic in the political, military, economic, and cultural spheres, and in a part of his speech, by referring to the activities of Voice and Vision, in connection with its full coverage of different parts of the country, stated:

Our brethren in the technical sector of the radio and television organization, in order to strengthen the country's television coverage in spite of the existing difficulties and war conditions, have proceeded to design and install 16 powerful television stations in different parts of the country, which, in the course of the last 3 years is the 10th powerful television station to become operational. In continuing his remarks, he stressed the point that all the stages of design, construction, and setting up transmission of the Badr station, has been carried out by the committed experts of the Voice and Vission of the Islamic Republic of Iran, and he stated: During the past 3 years, we have been able to commission television transmitters which equals what the shah's regime achieved over 12 years.

The powerful Badr television transmitter, which has been designed and erected to cover fully the first and second networks of the Voice and Vision of the

Islamic Republic of Iran, in the regions of Sirjan, Shahr-e Babak, and Rafsanjan, distributes on channels 9 and 11, the programs of networks one and two to the inhabitants of these regions. Also, the inhabitants of Rafsanjan can benefit on channels 5 and 9, from the first program of the Voice and Vision of the Islamic Republic, and on channels 7 and 11, from the second program of the Voice and Vision; and the inhabitants of Sirjan and Shahr-e Babak too, can obtain program one, on channel 9 and program two, on channel 11.

[Signed] The Central News Unit, Kerman.

CSO: 5500/4723

BRIEFS

NEW CONTRACTS OFFERED--The Communications Systems Group of Ferranti, has won a £2.5m. sub-contract to supply microwave radio equipment to the Ministry of Post and Telecommunications. The contract was awarded by the British company Balfour Beatty Power Construction, which is the main contractor for the communications project. In other news, TRT (France) won a 200 million francs contract for the turnkey completion of a major extension to the microwave radio transmission network. This order represents a follow-up to an earlier 160 million contract obtained within the framework of a French-German consortium (Siemens, Bosch, Fougerolles and others) in August 1983 for the installation of the north (Yaounde Maroua Kousseri) and west/northwest (Douala Bafoussam Bamenda) links of the country's microwave radio network. The new contract calls for the extension of the network to the towns of Sangmelima, Ebolowa and Kribi in the south, Nkambe in the northwest, Yokadouma in the east and Tchollire and Yahour in the north of the country. Cameroon's microwave network will thus include a total of about 120 stations equipped with about 600 transmitter-receivers made by TRT at its Brive plant. Installation work is scheduled to run until the end of 1987, the first partial start-ups being slated for early 1985. [Text] [Paris AFRICAN DEFENCE in English Feb 85 p 10]

CSO: 5500/106

BRIEFS

FRG RADIO, TELEVISION ASSISTANCE--Captain Mohamed Traore, minister of information and member of the Military Committee for National Redress [CMRN], this morning granted audience to the FRG ambassador to Guinea. During their discussions, the two officials examined bilateral cooperation, especially in the field of radio and television broadcasting and expressed their willingness to pursue and strengthen this cooperation. The Federal Republic of Germany will take part in the extension works on the television and assist in transforming it to a color television system. The Federal Republic of Germany has just donated to our country a large quantity of equipment for the Guinean radio and television within the framework of the long-standing cooperation existing between our two countries. [Excerpts] [Conakry Domestic Service in French 1245 GMT 5 Mar 85 AB]

CSO: 5500/105

BRIEFS

TELECOMMUNICATIONS LOAN AGREEMENT--Malawi and Tanzania have signed a 7 million-kwacha loan agreement with Norway and Sweden for the development of telecommunications between Mzuzu in Malawi and Mbeya in Tanzania. Announcing this in Blantyre today, the royal Norwegian counsel in Malawi, Mr (Christian), said the agreement was signed between the two Nordic countries and Malawi and Tanzania on 31 January during the Southern African Development Coordination Conference [SADCC] in Mbabane, Swaziland. He said the project is funded as part of the support from Norway and Sweden to SADCC where telecommunications is a sector given high priority. He said contract negotiation for the implementation of the project is in progress and work is expected to start within 6 months and be completed in 2 years time. [Text] [Blantyre Domestic Service in English 1600 GMT 11 Feb 85 MB]

CSO: 5500/92

NIGERIA

UNDER-USE OF INTERNATIONAL EXCHANGE BLAMED ON CONTRACTORS

Kaduna NEW NIGERIAN in English 29 Jan 85 pp 1, 3

[Article by Olu Adebayo]

[Text] The current under-utilization of the 16 million Naira international telecommunications exchange of Kujama, Kaduna State, has been blamed on the non-completion of telephone exchanges by contractors in the northern parts of the country.

Minister of Communications, Lt-Col Ahmed Abdullahi, explained while briefing newsmen on the activities of his ministry yesterday that while contractors in the South completed their jobs, those in the northern parts of the country mostly abandoned theirs for one reason or the other.

He said because of the non-completion of these exchanges, it was impossible for the ministry to connect them to the external gateway of Kujama.

"Had the exchanges in the northern parts been completed, commissioned and hooked to Kujama external service, one will say that we have sufficient customers to make a maximum use of that station," he said.

He, however, said his ministry had succeeded in linking Kujama through the Kaduna international exchange with Lagos so that telephone subscribers from the South could make use of it.

The linkage would allow subscribers in the southern part to receive their external calls through Kujama whenver there is an overflow of traffic on the Lagos International Exchange.

He said also that with the loan recently negotiated with the ITT Nigeria Limited which would make it possible to complete most of the exchange buildings, together with its installations in that part of the country, the problem of under-utilization would be solved.

The 16 million Naira Kujama satellite relay station was commissioned on May 24, 1983 as a second external telecommunications gateway for the country.

On the non-installation of the international telex exchange at Kaduna, a top official of NITEL explained that the delay was caused by the delay in obtaining import licence to facilitate the opening of a letter of credit in favour of the suppliers.

He said the ministry had taken up the issue and urgent efforts were being made to get the equipment down to Nigeria.

Col Abdullahi also disclosed yesterday that phase two of the integrated national transmission network was 80 percent complete. The project, when completed, will provide three alternative rerouting facilities for the north-south linkage.

He also disclosed that the total number of exchange lines in the country at the end of last year stood at 290,000 lines and was expected to go up to 300,000 lines when the Sokoto, Kano and Maiduguri exchanges were commissioned.

The minister denied that there was controversy between his ministry and courier firms in the country.

He said, however, that the right to transport mails internally should, as the practice all over the world, be the sole responsibility of his ministry.

CSO: 5500/110

NIGERIA

NEW TELECOMMUNICATIONS FIRM BEGINS OPERATION

Kaduna NEW NIGERIAN in English 14 Feb 85 p 5

[Article by Umaru Isa Galadanci: "NITEL: A Communications Industry Is Born"]

[Text]

NIGERIAN Telecommunications Limited - NITEL, is a new limited liability company which commenced operations in January 1985 as a result of the merger between NET and the Telecommunications Division of P&T Department. This merger, according to the Minister of Communications, Lt. Col. Ahmed A. Abdullahi, is a Federal Military Government's policy decision which is aimed at pulling together the resources of the two organisations offering similar and complementary services for optimum advantage and improvement in the internal and external planning and implementation of the national telecommunications development.

The Chairman of NET, Alhaji Ibrahim Aliyu's aim of the merger from the technical point of view is to:

(1) Enhance complementarity of P&T and NET.

(2) Eliminate the duplication of equipment. This will help in utilising the telecommunications system so as to provide better services for the nation.

It was anticipated that the Federal Military Government will own 60 percent shares and the remaining 40 percent shares will be acquired by private interests such as parastatals and workers of the new company. There will be five zonal administrative centres. Lagos is the headquarters of NITEL and a seat of one of the district offices. Other district offices are Ibadan, Enugu, Kaduna and Bauchi. This zonal arrangement will help in providing efficient telecommunications services all over the country.

From all indications, the merger is going to be a huge success despite the fear expressed from some quarters. In my point of view, the merger is a very good marriage of convenience-bringing the internal and external telecommunications services under one umbrella. Assurance is given by the authority that adequate arrangements have been made to secure the employment of the workers of NET and P&T within the new company so long as they are considered fit for their jobs. But the employees of NITEL need to be tolerant, cooperate and work together to enable the new organisation succeed. The attitude of the ministry's bureautic working culture, has to give way to an efficient working environment. NITEL needs to operate as a truly independent company as against the operations of the former NET and P&T under close supervision of the Ministry of Communications. This will enhance a more productive and profitable telecommunications business in Nigeria.

Prior to independence, the telephone service was so inadequate that it was an exclusive The International Direct Dialling (IDD) capability which is currently operational in the Lagos area only, will be extended to other parts of the country.

It was reliably learnt that the Ministry of Communications is currently establishing a network of subscribers Trunk Dialling systems and modern trunk lines to enhance telecommunications operations in the country. The already existing links between all major centres in the country will be incorporated into a "twinkle-of-an-eye" relay echo. Delays and disruptions in telephone services will be a thing of the past.

CSO: 5500/110

NIGERIANS TRAIN AT INDIAN TELECOMMUNICATIONS SCHOOL

AB222136 Lagos NAN in English 1615 GMT 22 Feb 85

[By Louis Chuke]

[Text] Ghaziabad (India), 21 Feb (NAN)--Nigeria's high commissioner to India, Rear Admiral Denson Okujagu, yesterday urged 30 Nigerian technologists undergoing a six-month course at the international telecommunication training centre in Ghaziabad, India, to work hard and acquire the best of the skills they were being offered to enable them to improve Nigeria's telecommunication services.

The New Delhi correspondent of the NEWS AGENCY OF NIGERIA (NAN) reports that the high commissioner, who was speaking during a visit to the centre, reminded them that the country at this stage of its development, needed their "added" skill. A spokesman for the students, Mr O. Ibizugbe, told the high commissioner that the course content was high and suitable to equip trainees for the day-to-day maintenance of the "PENTACOTA switching system" in Nigeria. He gave the assurance that the students, on returning, would help to increase the efficiency of the country's telecommunication services.

Earlier, the general manager of the institution, Mr H. C. Mathur, told the high commissioner that the school coordinates the course with the International Telecommunications Union (ITU) and offers training that would make its graduates able to handle situations in their places of work. He said that 200 Nigerians had passed out of the school since 1982 when a contract was signed for the programme.

The NAN correspondent reports that the contract was for the training of 400 Nigerian technologists of the "1,000 'C' type model crossbar "PENTACOTA switching system" used in Nigeria.

CSO: 5500/109

BRIEFS

UNION OPPOSES RETRENCHMENT PLAN--Ibadan, 18 Feb (NAN)--The Radio, Television and Theatre Workers Union of Nigeria (RATTAWU) had called on the management of the Federal Radio Corporation to shelve its proposed plan to retrench another 1,000 of its employees. Addressing a news conference on Friday in Ibadan, a vice president of the union, Mr David Oke, said that the retrenchment of "thousands of its members" by the corporation's management was unacceptable to the union. Mr Oke said that union had given a 14-day ultimatum to the management of the corporation to withdraw the letters of retrenchment already served on some of its employees or face industrial action. Mr Oke also said that the union was not pleased with the recommendation of the Kolade Panel to the Federal Military Government to reduce the NTA [Nigerian Television Authority] staff strength by 40 percent. He called on the Federal Government to reject the recommendation which according to him, could reduce the quality and quantity of programmes. [Text] [Lagos NAN in English 1632 GMT 18 Feb 85 AB]

IMO REPEALS BROADCASTING LAWS---The Imo State Government has repealed the Imo Broadcasting Service Law of 1976, the IBS [Imo Broadcasting Service] Amendment Law of 1977 and the Imo Television Authority Law, 1981. This is contained in the government gazette issued in Owerri. The order known as Edict Number 8 of 1984 further said that the staff of both the IBS and the ITV [Imo Television Service] are now transferred to the services of Imo Broadcasting Corporation. According to the gazette, all the property of the two establishments, whether movable or immovable, have become those of the Imo Broadcasting Corporation. [Text] [Lagos Domestic Service in English 1500 GMT 28 Feb 85 AB]

POOR TV RECEPTION---The VANGUARD expresses concern over the current poor reception of the Nigerian Television Authority's [NTA] network programs. The paper dismisses as untenable the NTA's excuse that the poor reception was caused by faulty satellite transmission. The VANGUARD calls on the management to critically examine the problem. [Text] [From the press review] [Lagos International Service in English 0830 GMT 8 Mar 85 AB]

NAN AGREEMENT WITH INTERPRESS--Belgrade, 8 Mar (NAN/PANA)--The services of the NEWS AGENCY OF NIGERIA (NAN) will now be received in the industrial and economic cities in Europe and the United States under an agreement with the INTERPRESS SERVICE (IPS), the general manager of the news agency, Mr Onuora Nzekwu, said in Belgrade on Wednesday. The Eastern Europe correspondent of NAN quotes the

general manager as telling the Nigerian ambassador to Yugoslavia, Mr James Sokoya, during a courtesy visit, that the move would expose Nigeria's economic potentialities to the regions, as well as help share a positive image for the country. Mr Nzekwu also said that under the agreement, Nigerian missions abroad would be able to receive NAN services and be in a position to know immediate developments at home. According to the general manager, the agreement, which takes immediate effect, would contribute to the expansion of the agency's foreign service. Mr Sokoya expressed satisfaction with the performance of NAN and said that it was contributing positively to the development of Nigeria. He promised support for the office of the agency in Belgrade. Mr Nzekwu was in Belgrade to attend the 10th meeting of the co-ordination committee of the news agencies pool of non-aligned countries which ended on Wednesday. [Text] [Dakar PANA in English 1302 GMT 8 Mar 85 AB]

CSO: 5500/109

SOUTH AFRICA

TV-4 AUDIENCE PROJECTIONS REPORTED

Johannesburg SUNDAY EXPRESS in English 24 Feb 85 p 16

[Article by Tony Koenderman]

[Text] TV4, which will be broadcast for the first time on March 30, could have an audience of anything between 1,5-million and 2-million this year, media experts estimate.

While much of this audience will be drawn from the 3,2-million people who now watch TV1, TV4 is also expected to pull in close to a million viewers who do not watch the box late at night.

TV1 attracts 1,2-million people after 10pm.

J Walter Thomson's media director Mr Dick Reed predicts that half of them will switch to TV4. He said the channel would also attract 900 000 new viewers, 300 000 of them black, giving TV4 an audience of 1,5-million.

Mr Adriaan de Buck, media director of Grey-Phillips Bunton Mundel & Blake, believes the audience could reach 2-million on certain nights.

"Some of the audience will be watching on a time-shift basis, recording programmes for watching the following night," Mr Reed said. "Clearly, this is likely to affect the home video business. What will be interesting for advertisers, however, is how many of these time-shift viewers will fast-forward their video machines to avoid watching the ads."

The flexible rates and procedures recently announced for the new channel have been widely welcomed by the advertising fraternity.

"This is a breakthrough by the SABC which few people would have predicted a year ago," said Mr de Buck.

Under the new deal advertisers will be able to choose specific days or weeks for their 'flightings', allocation procedures have fallen away and rigidity about product categories has been abandoned.

TV4 will be an entertainment and sport-oriented service broadcasting from 9.30pm to midnight.

No airtime will be sold on TV4 for the first month, but all spots on TV1 flighted after 9.30pm will also be flighted free on TV4 to offset any audience loss.

Mr Reed said this would be a plus for advertisers because there would almost certainly be a bonus audience attracted to the new channel.

TV1 spot costs will be halved between May 1 and August 31. During this period the new audience levels will be researched and assessed.

Also during this time, TV4 spots will be sold on more of a free sale basis than has been the case on TV1.

Thus for R7 200 per 30-second spot, advertisers will be able to choose a specific day — something they have not been able to do before. For R6 000 they may choose a specific week, while the lowest rate of R5 400 will be charged for 'run of station' — and the spot will be scheduled anywhere within the 17-week period.

Based on TV1's rate of R5 per thousand watchers, the rates suggest an audience expectation of a little more than one million. Obviously, if the audience exceeds expectations, rates can be expected to go up.

However, where the peak rate on TV1 is R12 000, some downward adjustment is likely.

The increased attractiveness of the new channel means that television's share of advertising expenditure could easily rise to 30% this year, and within two years may be at 35%, media experts believe.

CSO: 5500/107

SOUTH AFRICA

BRIEFS

RADIO 5 MEDIUM WAVE TRANSMISSIONS--The South African Broadcasting Corporation has announced in Johannesburg that from 18 March, Radio 5 will begin broadcasting on medium wave in many parts of the country. Daytime coverage on the new high-power amplitude modulated transmitter at Bloemendal near Vereeniging is about 200 km, while nighttime coverage will be virtually country wide. From 18 March until 1 April will be regarded as a test period, during which the transmitter might be shut down to make necessary adjustments or to correct faults.

CSO: 5500/115

ZAIRE

BRIEFS

RADIO EQUIPMENT REHABILITATION--Bandundu, 16 February (AZAP)--The Executive Council has decided to rehabilitate all transmitters of the Zairian Radio and Television Services (ORZT), in the interior of the country. To this end, an OZRT technical team has been in Bandundu since last Tuesday to collect the necessary data for this operation. [Excerpts] [Kinshasa AZAP in French GMT 16 Feb 85 AB]

CSO: 5500/108

BRIEFS

TELECOMMUNICATIONS AGREEMENTS WITH FINLAND--The Finnish-Soviet cooperation in postal and telecommunications traffic is to be expanded and deepened in accordance with two new agreements for cooperation within this sector. These were signed on behalf of the Soviet Union by Communications Minister V. A. Shamshin, who on Monday started a visit to our country. One of the agreements is a basic agreement of a new type between the two countries' governments. The other agreement has been entered between the countries' postal and telecommunications directorates. With that agreement, attempts will be made to observe those changes which are introduced in prevailing international agreements and regulations, as well as to adapt to the rapid development of the technology. [Text] [Helsinki HUFVUDSTADSBLADET in Swedish 5 Mar 85 p 5]

MARI ASSR TELEPHONE, TELEGRAPH COMPLEX--A new telegraph office [dom svyazi] has opened in Yoshkar-Ola, capital of Mari ASSR. This is the largest such complex in the autonomous republic, comprising an automatic telephone exchange with 10,000 numbers, and an automatic telegraph station linked to 130 cities. During the 11th 5-Year Plan the telephone network in Mari ASSR has grown 1.5 times. [Summary] [Moscow Domestic Service in Russian 0230 GMT 20 Jan 85 LD]

CSO: 5500/1016

EUROPEAN AFFAIRS

EUROPEAN SATELLITE TV TEST BROADCAST

LD011457 Hilversum International Service in English 0948 GMT 8 Feb 85

[Excerpts] Tommorrow sees the start of European satellite broadcasting -- well, almost. The Olympus television project, supported by national public broadcasters from Germany, Holland, Italy and Ireland will sign a contract with the Dutch PTT for the hiring of a channel on the present ECS communications satellite. At the same time a test program is being broadcast, mainly for reception by the 60 or so cable systems in the Netherlands, but one in Amsterdam has already decided to show it to its subscribers. While directors for the new Olympus project have now been appointed, no program makers have yet been hired. So tommorow's test transmission consists of a 40-minute documentary-style look at what European tv could be like, made by hiring staff from Radio Netherlands for a few days, hence this familiar voices.

Further tests from Olympus will take place later in the year or on 5 October when the first official transmission is expected.

The Dutch minister for culture, Elco Brinkman, has reserved 42 million guilders to help the project and in his proposal for the new media law in this country suggested that cable companies should be obliged to carry the new European program.

The reaction from the cable companies, though, has been cool especially as this may mean that on some cable systems with insufficient capacity Sky Channel will have to be replaced by Olympus.

CSO: 5500/2604

BRIEFS

MOBILE PHONE SYSTEM FROM FINLAND--The Belgian Postal and Telephone Service has ordered support stations for a car telephone system from the Mobira's Oulu factory. The whole value of the deal is about 28 million markkas, of which Mobira's part comes to about 14 million. The support stations have been developed at the Oulu factories, and their structure is comparable to the support stations in use in the Finnish network. The first, altogether 60, support stations will be given over at the end of this year. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 25 Jan 85 p 25]

CSO: 5500/2574

FINLAND

AGENCY PLANS TO OFFER SATELLITE SERVICES TO INDUSTRY IN 1986

Helsinki HELSINGIN SANOMAT in Finnish 17 Feb 85 p 39

[Article: "The Postal Service Ordered a Satellite Station From Nokia"]

[Text] The Postal and Telephone Service is intending to offer businesses and institutions multiple satellite services beginning in 1986. The services will be rendered with the help of the satellite system owned by EUTELSAT. EUTELSAT is the central supervising organ of the telephone boards of 20 European countries' satellite exchanges; Finland's share in it is 2.73 percent.

In the international bid competition for the ground station to be built in Helsinki, the Postal and Telephone Service chose Nokia Electronics as the supplier for the station. The supplying will be done in cooperation with Nokia, VTT [state Technical Research Institute] and Valmetti's Kuorovesi factory.

Founding the station will not cost much in monetary terms, about ten million markkas, but in the press conference held on Friday, Pekka Tarjanne, head of the Postal and Telephone Services, Kari Kairamo, Nokia's managing director, Pekka Jauho, director of the State technical research center, and Juhani Kuusi, general manager of the Center for Technological Development, all assured that they were well pleased with the venture.

The gentlemen considered the venture an example of what can be achieved in Finland with advanced technology and space-technology, when cooperation succeeds between different interested parties.

The services offered to businesses and institutions are video-and audio-conferences, information exchange between computers, long-distance printing of newspapers and other quick facsimile, tele-typing and electric mail. Possible users of the services are Finnish and foreign businesses which need high-quality information links between their offices in different countries.

According to the manager of the station, success in the heavy international competition would not have been possible, if the development of the station had not been started as a technological and political venture immediately when the Telephone Service's plans were available at the end of 1981.

Six Meter Antenna

A very surface-sensitive antenna with a six meter diameter will be built for the ground station; it will follow the movements of the satellite with directional measurements. The station functions without personnel.

What is in question is a new area conquered by Finnish industry, because complete information exhange satellites have not been made in Finland before, VTT has been in charge of the production planning; Nokia has polished it into an industrial product.

According to director Pekka Tarjanne, the system that is underway offers the same services as a general data network, but with additional special feature, of which the most important one is the ability to simultaneously send data to several receivers located far from each other.

The system also makes new adaptions possible, such as broad-based computer-networks, information banks and telephone-conferences. Of course the satellites, according to Tarjanne, nowadays have to compete with even more modern technical resources, such as, for instance, glass-fiber technology.

The First Significant

General manager Kari Kairamo thinks that the satellite station is the first significant space-technology venture in Finland. As a focus of development it is many times more expensive and demanding than for example television-receiver stations, and for this reason it has necessitated the pooling of international resources, says Kairamo.

Juhani Kuusi of the Center for Technological Development stressed the necessity for international cooperation. Finland is trying for just that, in its attempt to join Europe's space agency ESA's membership; the negotiations over that are in progress; the answer will probably come sometime this year.

12688
CSO: 5500/2574

FINLAND

NOKIA SEES SUCCESS FOR EARTH STATION, SPACE TECHNOLOGY ROLE

Helsinki HUFVUDSTADSBLADET in Swedish 16 Feb 85 p 15

/Article by Richard Brander: "A Finnish Gold Mine? Nokia's New Presentation: Satellite Stations"/

/Text/ Nokia Electronics delivers an earth station to the Central Board of Post and Telegraphy. The station connects Finland to the European EUTELSAT Satellite Network and it represents the first step toward a domestic space technology. The stations may become a gold mine for Nokia--the international market is worth tens of billions of markkaa.

Businesses and institutions can carry out negotiations through the new earth station, interface with other computer centers and terminals and transfer data as well as handle video transmission in Europe.

The earth station has been developed by VTT /State Technical Research Center/ and Nokia has constructed it. This is VTT's most important project in the area of space technology and it started in 1981.

Finland is a member of EUTELSAT (the European Telecommunications Satellite Organization) the first satellite of which was launched in the fall of 1983. Parliament ratified the EUTELSAT agreement in January of this year.

The first EUTELSAT satellite has been leased to private organizations. We see, among others, "Sky channel" and the French TV-5 via this satellite.

The second European satellite was launched last summer and it transmits telephone conversations, TV video transmissions and the SMS system. SMS stands for Satellite Multiservice System and it is directed toward business communications.

The SMS system will be ready to use this year and the Central Board of Post and Telegraphy offers it this year to Finnish customers starting next year. Eutelsat is going to launch a third satellite this year and like the first one, it will mainly be used for TV transmission. Thereafter another fourth satellite will be launched and it will be a complement to the other satellite.

A Step Toward Domestic Space Technology

The background of the Finnish SMS earth station is a work group that was appointed in 1980 by the Ministry for Trade and Industry for the development of space technology in Finland. A decision was then made to initiate the development work on an earth station for special communications.

VTT has performed development work in close cooperation with Nokia Electronics, Valmet's plant in Kuorevsei and the Central Board of Post and Telegraphy.

The space technology research at VTT will be further strengthened. The research center is participating with Finnish companies in the deliveries for the joint Nordic Tele-X project. VTT is also getting prepared for an increased international cooperation. Finland is expected to shortly join the European space organization ESA.

A Potential Billion Mark Market

The development costs for the earth station have been fairly large, but the construction itself will not cost more than about 5-8 million markkaa. The development of this first unit should be considered an initial stage. Nobody can really say how great the demand on stations is today. A figure that is mentioned is in any case 200 (in Europe) but in the long run the market might be worth several billions.

The first earth station will be placed in Fredriksberg in Helsinki.

9662
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GREECE

DEVICE ADAPTS TV SETS TO RECEIVE SOVIET PROGRAMS

Athens TA NEA in Greek 18 Feb 85 p 8

/Article by Deby Golema/

/Excerpts/ Television by satellite has already "knocked" on Greece's door. An event, that just a short time ago seemed like a fairy tale, is becoming a reality as time goes on. Already, a Greek industrial firm is picking up clear signals and pictures from a Soviet television satellite with the proper installation of a special antenna.

But why from the Soviets and not somewhere else? Because the Soviet Union is the only country on our continent (the Americans are still in the experimental stage) that has installed television satellites, indeed four of them. These satellites are called "Horizon" and one of them-- the one we can get-- was launched over Ghana.

The Soviet Union launched these satellites shortly before the Moscow Olympics (1980). As the firm's officials told us, such an antenna installation and other special equipment now costs about 250,000 drachmas.

Any television set can pick up this satellite, even a 1965 black and white model.

Since we are talking about television satellites, let us say a couple of words about them: satellites are launched in a special trajectory over the equator. Their life span is around 10 years after which they are replaced by new ones. The old ones remain in space. The cost of a television satellite is 17 billion drachmas.

So, whoever wants to get a picture from a television satellite has only to install a special reflector on his terrace. At the moment they will have the opportunity to see the Soviet "Vremia" channel. In 1-2 years, both the French and Germans will have launched their own television satellites. It is certain that a new era has begun..

5671
CSO: 5500/2595

ICELAND

NATIONWIDE COMPUTER NETWORK TO START IN FALL

Telecommunications Agency Chief Comments

Reykjavik MORGUNBLADID in Icelandic 17 Jan 85 p 2B

[Article: "Icelandic Computer Network for Public Use by this Autumn"]

> [Text] A public computer network will be put into use in Iceland next autumn. According to Thorvardar Jonsson, chief engineer of the Icelandic Post Office, the equipment is now in Iceland and its installation will begin next month with the help of experts from Ericsson, the Swedish manufacturer.

"The equipment will be delivered in April and we are planning on a month or more to train employees and carry out acceptance tests," said Jonssonar. "We plan for this reason to be able to offer Icelandic users the choice of trying out the Icelandic net during the period from June to September since we will not be billed before 15 September. Thus we will not be attempting to bring the net into full use until the end of September, beginning of October."

The public computer network consists of headquarters in Reykjavik with 140 terminals and six stations within Iceland, at Stykkisholmur, Isafjordur, Blonduosi, Akureyri and Egilsstadir. These stations have a total of 160 terminals so that the total system will comprise 300 terminals. In addition, there will be an administrative office for the whole system in Reykjavik that will supervise everything taking place within the system, will receive all accountings and orders and will carry out all whatever directions and changes there are.

The Icelandic network is what is called an off-line (packed) system, something that is now much more common than what is called an on-line computer net. An off-line system works in such a way that the information to be transmitted is "packed" into some kind of package of convenience. In each package there is information on receiver, sender, the number of the package and various kinds of command information. Packages from many users are then dispatched to others along the lines existing between

sending and receiving stations. In this lies the primary expense of an off-line system wince this type of system strives to connected dissimilar users of varying information processing speeds and "protocol" or control regulations. For example, a large primary station at the home office of a company, a high-speed one-line station, would be simultaneously in connection with many slow speed secondary stations located in the branches of the company.

The off-line computer net is known under the name X.25, called according to the standards for this system. The standard is almost 100 pages, extremely full and detailed, but its sole purpose is connections between user equipment and the computer net so that a user with equipment of a given manufacture can talk to another user with equipment of the same or different manufacture.

About the public computer net and its costs that the system was a completely new design and technically extremely far developed. This means, among other things, that it will be very easy to add to the computer net. It will ensure great reliability and error-free data transmission and likewise substantial and careful control from the system administration. It will also make possible many kinds of self services.

Costs 20-25 Million

Connections between the headquarters in Reykjavik and branches situated widely about Iceland will be through one of two lines with a speed of 9,600 bites a second for either line. However, there is a proposal to put into use at a later time a line that can transmit 64 kilobites per second. According to Jonsson, a foreign connection will be established through opening lines to London and Scandinavia (probably to Copenhagen) and perhaps to New York if use justifies. Through connection with London (for example) access to the entire world, so to speak, will be given to users.

Charges for use of the computer net are still under discussion, according to Jonsson, but charges will be based upon the following three major categories: destination, time and how much information is transmitted. In addition, users may pay an installation charge, as is done within the telephone system, and a rental charge for a number and line.

Total investment of the Icelandic Post Office in the computer net will be between 20 and 25 million kronar and, according to what Jonsson says, those within the Post Office system think that we have received a lot for our money in view of how technically advanced this Ericsson system is.

Details on Capabilities, Operation

Reykjavik MORGUNBLADID in Icelandic 17 Jan 85 p 5B

[Editorial: "The Computer Net, For Whom?]

> [Text] The public computer net that will be put into use this autumn will be completely comparable to a public telephone system in other ways except that there will be computers, monitors and printers for data transmission replacing telephones. The public computer net will benefit, first and foremost, companies and institutions able to exchange data and information by means of the computer net, and especially within companies and institutions whose operations are spread over a wide area, the nation as a whole or among several neighboring countries. The system, however, can also benefit individuals in many ways.

Public computer nets now exist in most of Iceland's neighboring countries and in those countries with which Iceland has the most connection. We may mention PSS and IPSS in the United Kingdom, Telent and Tymnet in the United States, Transpack in France and Datex-P in the FRG. The NPDN has been put into operation in Scandinavia as a public Scandinavian computer net. But that system is an on-line system and the situation now is that each of the Scandinavian countries has established or plans to establish its own computer net. But all of these nets are off-line nets, as are those discussed above and the computer net to be put into use in Iceland.

Icelandic companies will have access through the connection of the Icelandic computer net with these foreign computer nets to various data banks and a variety of specialzied information connected with collection of documents, trade and consignments. But it will not just be companies that will be able to use the system. This is because the Icelandic computer net is being prepared in such a way that individuals with personal computers can gain access to it and establish contact with other users or with data banks, either at home or abroad. What is needed for this is a special translation device, a PAD [Package assembly-disassembly], which will grant access to the public computer net to personal computers, and a modem to hook the computer into the telephone system. The user will simply call a predetermined number connected with the computer net. There he will receive a user's number and user name and subsequently contact with the computer net. The speed of data transmission for such use is 300-1,200 bites per second and could be 2,400 bites per second later.

Among other services to be offered we may mention "Teletex," which Thorvardur Jonsson, Icelandic Post Office engineer, explains as a kind of "super telex" since the rate of data transmission is 2,400 bites a second compared to 50 bites with a conventional telex.

It has also been decided to establish service based on the phenomenon that has been called the electronic mailbox, as an addition to the public computer net. According to Jonsson, it will be necessary to hook up new computers with large memories at the net headquarters to make this service possible. But through this service users will be able to exchange letters through their computers. One use of the net will send a letter to another user of the net by writing his message on his computer and then sending it to the post box of the receiver in the computer net. The receiver will call up his post box with his computer to find out whether or not there is any message or information and if there is he will have his computer receive the message contained in the post box. There can be several variations in this service, for example, service that would allow the post box or rather the main computer to send all messages and letters in the post box to the receiver daily at a certain time.

Many will thus be in support of the public computer net and the possibilities that it will offer, if Iceland is to advance a little into the computer age.

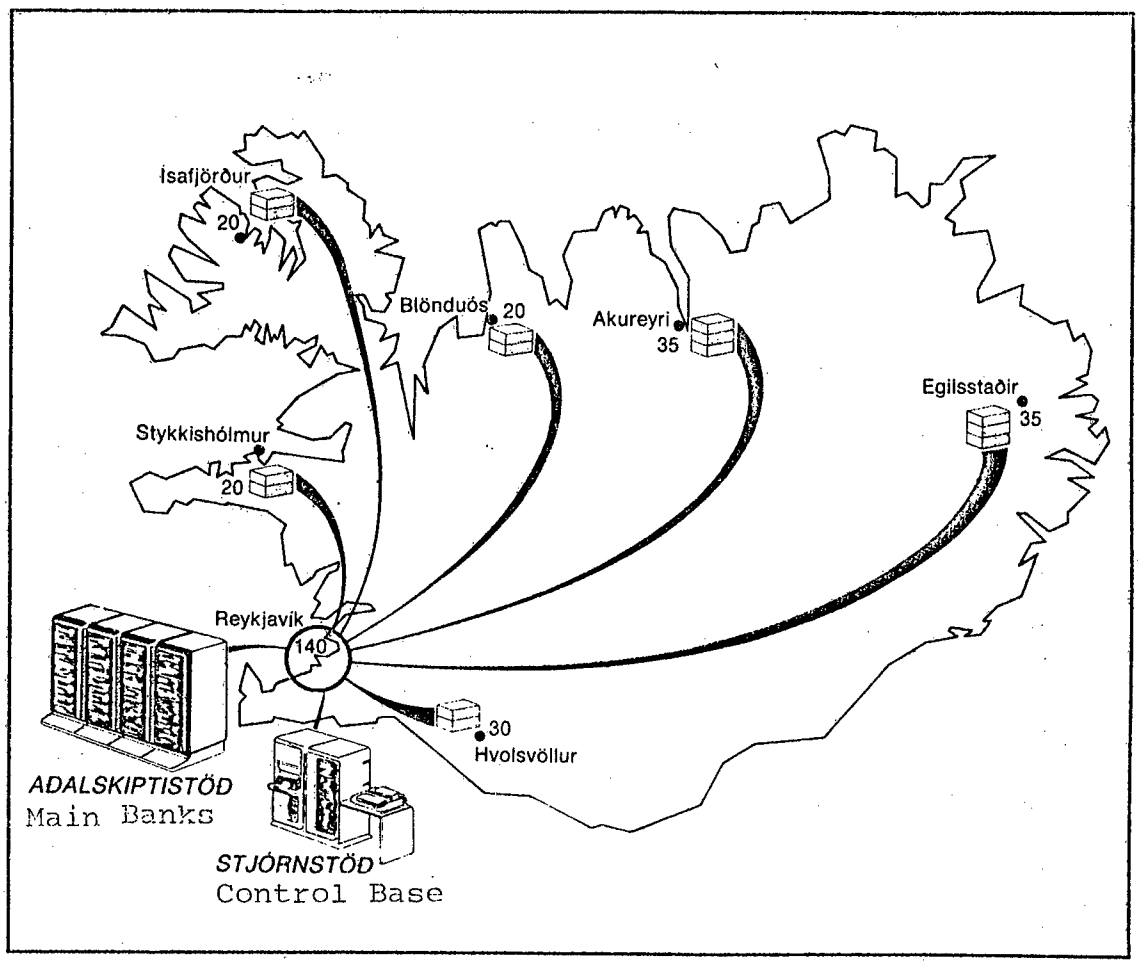

Figure 1: Icelandic Post Office Computer Net. Figures show Numbers of Terminals

9857
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ICELAND

CHAMBER OF COMMERCE HEAD ON TRENDS, NEEDS IN TELECOMMUNICATIONS

Reykjavik MORGUNBLADID in Icelandic 17 Jan 85 p 6B

[Article on Speech by Engineer Gudmundur Olafsson to the Icelandic Chamber of Commerce: "The Best Possible Telephone System under Development"]

> [Text] Companies that require individual phone systems of more than 150 telephones have had to put off purchasing such systems as long as possible. Up until now there has been no alternative to such large computer controlled individual systems, especially in terms of the current developments in the computer controlled telephone systems. The Icelandic Post Office has offered telephone systems of 150 or more lines, but the cost of these systems is such that the expense can hardly be justified in terms of the technology involved.

These facts emerged from a morning meeting that the Icelandic Chamber of Commerce promoted recently. Engineer Gudmundur Olafsson reported at the meeting on various innovations in telephone technology and the telex area and likewise on new prospects arising from new telecommunications laws wherein the monopoly of the Icelandic Post Office is abolished for certain user equipment. Olafsson said that in many respects the characteristic of technology in this area is how quickly new equipment becomes obsolete. Certain technological solutions have been achieved in this area that only a short while ago were either too expensive or completely unheard of.

The Revolution of Computer Controlled Phone Systems

Olafsson said that under consideration here, first and foremost, is the impact of computer technology upon the telephone systems of companies, systems which now embrace new use possibilities with increased productivity and convenience for employees, for employers, who will now be able to exercise better supervision over misuse of phone systems, and for customers. Customers will receive better service since computer controlled phone systems will be so designed that if one phone is not

answered, the system will quickly ring the next phone in the system and then one after the other until there is an answer. Customers will thus not have to wait for long periods of time.

Olafsson said that the arrival of the computer controlled telephone system has brought about long overdue development in small telephone systems with 5 to 50 lines. I may be said that there has been a major change in what is available to small companies in this area. They can now receive small computer controlled systems with great potential. Olafsson said also that noteworthy things have likewise occurred in the normal development of medium sized phone systems (50-150 lines), but that large phone systems of over 150 lines have lagged, as noted above. Olafsson said also that he had heard it said jokingly that with the new computer-controlled Mula Station various services such as, for example, switching from one number to another, will be offered to small companies.

Olafsson said concerning changes in telecommunications laws and abolition of the monopoly of the Post Office in user equipment that there is now uncertainty in this area as to whether or not increased competition in this area will lead to decreased costs of phone systems soon.

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CSO: 5500/2598

ITALY

TEN-YEAR NATIONAL COMMUNICATIONS PLAN SUMMARIZED

Rome POSTE E TELECOMMUNICAZIONI in Italian May 84 p 68

[Text] Posts and Telecommunications Minister Antonio Gava in mid-November outlined for the Chamber's Transport Commisssion the salient fratures of the (1985-1994) 10-year plan for telecommunications. The plan assigns the telecommunications sector a strategic role for the entire country.

According to the estimates, total investments over the decade wil probably reach 100,000 billion lire (66,000 billion, 20 million at 1983 prices).

Gava also mentioned the two alternatives to integrating the telecommunications sector: unification of all telecommunications installations and services under the State Participations aegis, or concentrating all telecommunications services and plants into two structures, one of them publicly owned and the other incorporated into the State Participations sector. Going on right now -- Gava reminded the Chamber -- is a dispute with organized labor. Under the first assumption, the national services would be segregated from the international ones and entrusted to agencies juridically distinct from one another (shareholder corporations whose capital would come partially or totally from the public sector), yet homogeneous. The second assumption involves establishment of a new public structure along "agency-enterprise" lines, with responsibility for installation and operation of the transmission facilities that make up the domestic and international systems. The domestic services would all be managed under a concession system.

On an earlier occasion, last July, in his introduction of the plan to Parliament and to the representatives of organized labor, the PTT minister said that it amounts to a redefinition of the plan approced in 1982 by the Interministerial Commission for Economic Planning (CIPE) whose latest edition, covering the 1985/1994 decade, in relation to the ongoing advances in technology and services, lays down guidelines for development of the entire range of sources making significant technological and financial decisions in connection with the expansion of existing services, the introduction of new services, and the use of advanced technologies.

The national telecommunications plan is a carefully planned document of the utmost importance in view of the vital role telecommunications will play in the information society that already stands at our threshold, substantially affecting every area of public and private life, with salutary effects upon industrial activity in the sector, and hence on employment.

Spending is earmarked primarily for modernization of a sector now "undergoing profound evolutionary change," said Gava later on in an interview with GR2. "We are transforming the so-called highways of communication into fiber-optics highways for ever-swifter transmission." Yet another area of interest had to do with the operation of the postal services, which are still deemed far too slow. "We should be able to deliver a letter within a day, or, at most, 2 days, and we are really making progress there. We have begun work on the so-called electronic mail that will travel over optical fibers and will cost more than 200 billion lire. We have moved to automate all the services, for both letter and package mail. By way of example, we recently displayed at Hamburg, thanks to the Italian firm of Elsag, an ultra-modern machine that, through a computer, can sort mail by address and hand each individual carrier the mail he is to deliver."

6182

CSO: 5500/2605

ITALY

PIRELLI TO ENTER OPTICAL FIBER INDUSTRY VIA BUY-OUTS

Milan MONDO ECONOMICO in Italian 21 Feb 85 pp 67-68

[Article by Giuseppe Oddo: "Pirelli Pockets David, Focom"

[Text] First came the long months of secret negotiations. At last, a few days ago, came the announcement: Pirelli had acquired major interests in two foreign corporations. This was a two-phase operation. First, in late December, it picked up 10 percent of the shares of David Systems, Inc, a company located in Sunnyvale, in California's Silicon Valley.

The second phase began in mid-January, when Pirelli acquired 60 percent of Focom System, Ltd., a middle-sized British company specializing in systems design. Combined cost of the two acquisitions: around 11 billion lire. Actually, Pirelli had bought, in 1984, 15 percent of Litel, a U.S. company that is building a privately owned telecommunications network.

That acquisition, though, is part of a more generic process of internationalization affecting all industrial activity. The deal just announced, however, officially marks the entry in force of the world leader in cable into a new and promising production sector: fiber optics. The decision came after more than a year and a half of market analysis and testing, until on 1 October 1984 (as part of its cable sector) Pirelli set up its fiber-optics systems group.

"Fiber-optics systems," says Andrea Oddi, director of this newest Pirelli venture -- "are systems that can communicate data, voices, and images, in which the usual transmission vector is fiber-optic cable inserted into local private networks."

Fibers in the Factory

With the passage of time, in fact, the use of fiber optics, which initially were utilized almost exclusively to replace telecommunications coaxial cables, has spread to other sectors: in the automation processes in offices, where fiber-optics are used to link terminals and work-sections with the company's main-frame computer.

In addition, since optical fibers are immune to interference, they are beginning to appear in factories to link the programmable computerized monitors with the machines. This effectively obviates any chance that a magnetic mass in motion, such as a motor, might interfere with proper computer performance.

For similar reasons, optical fibers find work in security systems as well. On a military base, or in a bank, for instance, transfers of information call for the utmost secrecy. Optical fibers will shelter lending institutions from "electronic theft." In transportation, optical fiber systems are used to monitor traffic flow and bus routes, to control traffic in railroad marshalling yards and at airports, and to manage arrivals and departures in major bus terminals.

Automation and Security

The Pirelli group, foreseeing such market trends, initially, in the early Eighties, built two fiber production plants: one at Battipaglia in Italy, in partnership with the STET-IRI group, and another at Southampton in England. Today, with the establishment of the fiber-optics systems group, the second phase, which will complete the production cycle, has begun. This cycle begins with the development of optical fiber cables, moves on to designing the "architecture" of networks and of their software, and ends with their installation and technical assistance.

Among the many possible applications of optical fibers, however, Pirelli has given top priority to factory automation, security, and computerization of transportation terminals. Having singled out these three areas of production, the company is now trying to break into several markets which, upon careful evaluation, look to be of particular commercial interest: North America, Great Britain, Brazil, Italy, France, Spain, and Argentina. "Here," says Oddi, "the fiber-optics market is expanding at a mean annual rate of 35 percent."

Buying Companies

Organizing for this operation on the Italian market was fairly simple. All Pirelli had to do, actually, was to reorganize companies like Solari of Udine, which specialized in data collection and transmission, Dima of Milan, maker of automatic dispatching systems, and Boselli, another Milanese company that designs and installs security systems.

In order to break into the international markets, though, the most expeditious approach seemed to be that of taking over companies. Hence the deal announced a few days ago. It is no accident that Britain's Focom System, Ltd. is active in the automated factory sector, as well as in that of security and that of computerized terminal operations. And the American David Systems Inc, is itself involved in producing very advanced private branch exchanges

(PBXs, which are private electronic telephone exchanges that can process both voice and data messages in office and factory communications systems).

Pirelli is not about to stop here. Its presence in the fiber-optics field is destined to grow fast. High-level contacts -- confirmation comes from the top management of the Milan-based multinational conglomerate -- are already under way and it is not very difficult to guess that they involve primarily the United States and Japan: the two countries that are technologically most advanced in the fiber-optics field.

6182

CSO: 5500/2605

NORWAY

MINISTER PREDICTS HEAVY STATE INVESTMENT IN DIGITIZING

Oslo AFTENPOSTEN in Norwegian 21 Jan 85 p 33

> [Text] In the house journal an EB TeleCom [Electric Bureau's Telecommunications Department] Communications Minister Johan J. Jakobsen writes that if there is no major national catastrophe in the course of the next years, we will by 1990 have spent 20 billion kroner on new investments in the telecommunications network, and a significant portion of this will go toward digitizing. This figure is confirmed by the director of Televerket, Per Mortensen, formerly technical director.

"We are now up to 3.5 billion kroner in total investment this year," says Mortensen. "Even if the amount of the investment might be somewhat reduced, the matter still adds up to 20 billion kroner by 1990."

"Does this mean there will be Norwegian deliveries?"

"The first deliveries, which are administered by STK [Standard Telephone and Kabel Factory] come from ITT's plant in Belgium. (ITT is also the chief stockholder in STK), but STK will itself take over production. According to the estimates, during the first 3-4-5 years, some two-thirds of the supply contracts will originate from Norwegian firms. If there is international competition for further development, the Government will have to take a position. But EB will participate in the next round of competition. With either STK or EB responsible for later development, the Norwegian share of supply contracts will continue at about two-thirds of the total."

In his article in EB TeleCom's house organ, Communications Minister Johan J. Jakobsen informs us that the sales volume of data equipment in Norway will rise to 6-7 billion kroner annually (3 billion in 1982). In the area of telecommunications and data communications equipment, present installations in Norway come to 10-12 billion kroner per annum. Jakobsen believes that it will be altogether possible for Norwegian officials to establish guidelines that will make it possible for Norwegian producers to derive genuine profits from cooperative ventures with the most prominent foreign concerns in data and telecommunications.

12723
CSO: 5500/2568

NORWAY

FIRM GETS CONTRACT FOR NEW GENERATION DIGITAL SWITCHBOARDS

Oslo AFTENPOSTEN in Norwegian 2 Feb 85 p 40

[Article by Ulf Peter Hellstrom: "Tele-contract for 70 Million"]

[Text] The Telecommunications Domestic Industrial Group (TBK) entered into contracts on Thursday with EB SCANWORD and TELETTRA/KG Technical for the purchase and delivery of a new generation of digital switches from the private suppliers to TBK for sale in Norway. For the private telecom companies, the TBK contracts have an annual worth of at least 60-70 million kroner. "This renews our offering to the many small and medium-sized business firms that need new switches and switchboards," said Bjorn H. Syversen of TBK to AFTENPOSTEN.

For the EB-division, EB SCANWORD, the new contract with the National Telecommunications Administration's future subsidiary company, TBK, has an annual value of at least 50 million kroner, and this estimate is probably conservative. The requirement for modern switches in businesses that need 30-200 telephone lines is very great, and therefore the sale of EB switches as part of TBK's UNIPAX series can be greater than the parties had anticipated. The two joint venturers, KG/Technical and TELETTRA in Halden will supply more specialized systems for security functions and other types of special function. Customers in the business sector will probably buy these systems in a volume that yields sales on the order of 40 million kroner for TBK, these two companies believe.

The contracts represent the last phase in a long process that started with an international bidding round, where sixteen contractors in all responded. "For us there is significant strength in our future export drive with this product when we can point to the result of this international bidding-round," said Nils A. Grimsmo of EB-SCANWORD. In the first go-round, the division has its sights set on export sales comparable to the TBK deal, and in the long run its goal is an increased export trade that will be two or three times its domestic sales volume.

EB's switch was developed in Norway. EB has traditionally based important parts of its operation (within the telecommunications operation) on the

transfer of technology and patent-licensed production from the Ericsson Company which, second to the Bugge Group, is the largest stockholder in EB with 25 percent. "It is a strategic goal for EB to own and control our technology," says division director Per O. Fjell of EB-SCANWORD.

The digital switches from EB, which are already in operation at six test-installations in Norway, will be exported not only to Europe and Japan, but also to the United States.

12723
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SWEDEN

COMPROMISE PROPOSED IN TELECOMMUNICATIONS MONOPOLY DEBATE

Stockholm DAGENS NYHETER in Swedish 19 Feb 85 p 10

/Article by Kerstin Kall: "John-Olle's Telecommunications Compromise: Basic Apparatus for Everybody"/

/Text/ The National Telecommunications Administration's monopoly on the telecommunications network, switchboards and modems for high speeds should continue to exist. What else is left can be opened to competition. In regard to telephones there is still much that supports the idea that "a basic apparatus" from the Telecommunications Administration should belong to each subscription.

This is the opinion of Commissioner John-Olle Persson (Social Democrat) who on Monday gave his opinion on "certain issues within the area of telecommunications" to Minister of Communications Curt Bostrom.

One of these issues is the trouble between the union and the National Telecommunications Administration and between different union organizations about whether Teli should or should not become a joint stock company on 1 July of this year.

The date might have to be pushed forward somewhat in order to allow time for Teli's leadership and Teli's union to reach a decision," says John-Olle Persson.

The commissioner himself thinks that it is good if Teli becomes a joint stock company, despite the fact that the social democrats voted against it when the conservative government pushed through the decision in the Riksdag.

Possible With Joint Stock Company

"A continued competitive production will demand proper economic investments for research and development," he says. "Teli must therefore be able to use the profit of its own production for development activities. The form of a joint stock company makes this possible."

He believes that even the State Employees' Union will accept that opinion if only time is allowed for continued discussions.

The Telecommunications Administration wants to eliminate its monopoly on telephones. The government headed by Curt Bostrom has so far hesitated. John-Olle Persson is trying to reach a compromise.

"The Time is Ripe"

"The time is ripe to give up the monopoly in telephone apparatuses," he says and speaks in the next breath about obligatory basic apparatusses from the Telecommunications Administration as part of every subscription.

Can you then speak about the monopoly being eliminated?

"Yes, you can," says Commissioner Persson. The telephones beyond the first basic apparatus are now the main part of the market."

The motivation for the basic apparatus is that the Telecommunications Administration is responsible for its costfree maintenance.

The Office and Data Processing Equipment Trade Association /LKD/ has demanded that the monopoly on switchboards is given up. That is not supported by John-Olle Persson.

He encourages, on the other hand, the Telecommunications Administration to try to manage the switchboard monopoly in such a way that the Telecommunications Administration will not, as was the case with the telephones, be run over by a development which is completely beyond its control.

Solved Itself

A part of John-Olle Persson's task has solved itself during the process of the work. That regards the cooperation between the Telecommunications Administration and LM Ericsson. They have themselves reached collaboration agreements that Persson now only says "yes" to.

John-Olle Persson is generally of the opinion that the Telecommunications Administration and also the union organizations have unnecessarily rigid forms for their work.

Any national strategy that the State Employees' Union and the Metal Workers' Union asked for John-Olle Persson does not believe in because of the fast development within the area of telecommunications.

What is required more is an organization that can act from the outside based on strategic conditions and possibilities.

Freedom and flexibility for the Telecommunications Administration and stronger local ties for the union are desired by John-Olle Persson.

Curt Bostrom wants to withhold comments until the end of March when the tele-proposition of the government is presented.

9662
CSO: 5500/2590

SWEDEN

AGENCY TO EXPAND NATIONAL FIBER OPTIC NETWORK

Stockholm SVENSKA DAGBLADET in Swedish 21 Feb 85 Sect III p 1

[Article by Gote Andersson]

[Text] The Telecommunications Service will expand the national telecommunications network by 2,500 km of fiber-optic cable from Lulea in the north to Malmo in the south. This will provide an almost unlimited increase in the capacity of our telecommunications network.

The management of the Telecommunications Service made this decision yesterday. Investments will total 430 million kronor. The expansion will begin this fall and be complete by 1989.

"This is a major breakthrough for fiber optics in our national network," said Kjell Ohman, chief of the network planning division of the Telecommunications Service. From a technical standpoint, the same capacity could be produced with a radio relay system, but it will be less expensive to use fiber-optic cable.

The cable will have 12 fibers and, initially, each fiber will transmit 1,920 telephone channels, but in the future the transmission capacity can by increased to over 1 million telephone channels.

For this reason, the fiber network is an important strategic decision that is designed to meet the rapidly expanding demand for telephone and data traffic, which is increasing in the national network at an annual rate of about 14 percent.

Expected Increase

The Telecommunications Service expects that data communications, especially, will expand rapidly in this country. Today there are about 300,000 computers or terminals that use the telecommunications network to transmit data. The Telecommunications Service expects this figure to reach about 1 million terminals within several years.

Data communications now account for about 12 percent of all telephone traffic and by the nineties this share will have increased to about 50 percent,

according to estimates by the Telecommunications Service.

Last week the Telecommunications Service launched a number of new services under the collective name Digitals 1987. Its primary purpose is to permit industry and management to increase their data communications.

"By deciding to increase the capacity of the national network by using fiber optics and radio relay systems, we are guaranteeing that the Telecommunications Service will be able to meet growing demand," Kjell Ohman said.

Combination

The capacity of the telecommunications network will be increased by a combination of digitizing old cables, constructing new digital radio relay systems, and building the fiber-optic cable network. The first digital connection in the national network was a radio relay system between Stockholm and Malmo, which began operating in the spring of 1984. Thus, the main task of the Telecommunications Service is to establish a nationwide digital network.

Before the decision to install the fiber-optic network was made, Kjell Ohman was visited by local politicians from various parts of the country. They fear that businesses in their region will suffer if they do not receive the fiber-optic technology. They do not want to be left out.

For this reason, Kjell Ohman pointed out that it would soon be possible to offer digital connections to all companies throughout the country, either with fiber optics, old telephone cable, or radio relay systems.

He also pointed out that local telecommunications networks would greatly increase their capacity as a result of the fiber-optic system, new radio relay connections, and digitizing of old cables.

"Thus, there is no danger that any community will be left behind," Kjell Ohman said.

New Possibilities

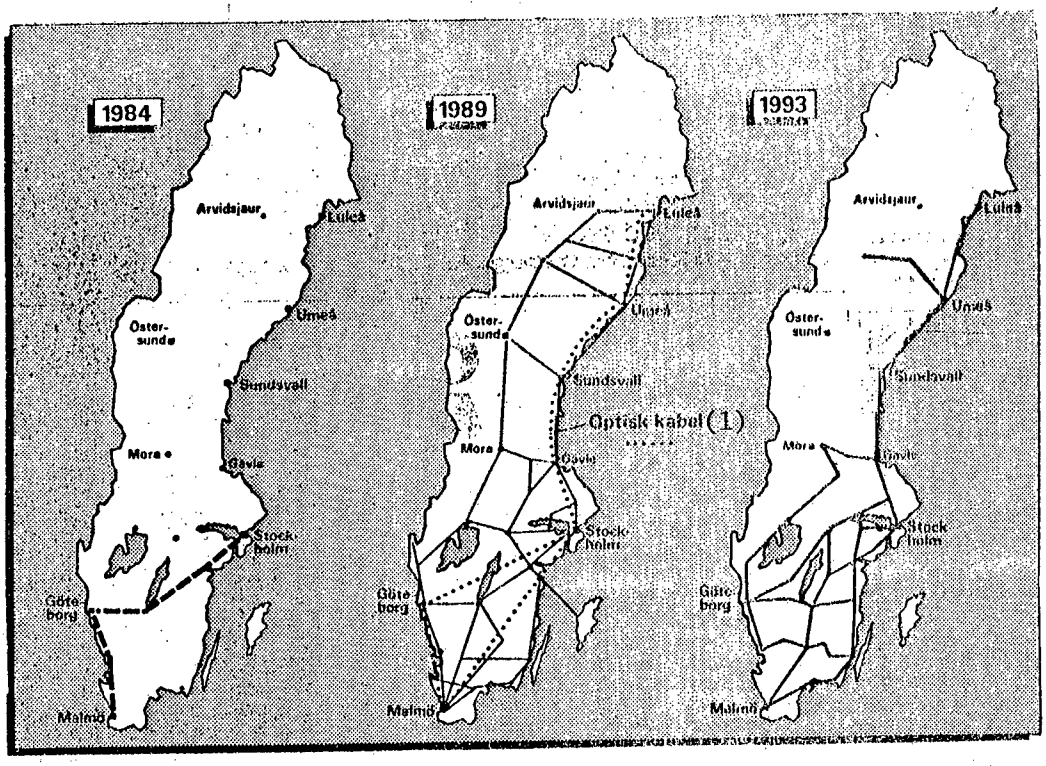
At the same time, the fiber-optic cable will open up new possibilities, once it is in place. Initially, two fibers will be used for local traffic and four for nationwide telecommunications traffic. The six unused fibers represent future potential for the Telecommunications Service.

The Telecommunications Service is discussing the possibility of using some fibers for cable TV distribution in Uddevalla and Sundsvall, thereby eliminating the need to construct a large number of receiving stations for satellite TV.

Ericsson Cabels, which produces fiber-optic cable in Hudiksvall, probably will manufacture most of the cable. Ericsson also is in a good position to deliver transmission equipment for the fiber-optic cable network. The

Telecommunications Service probably will purchase equipment from other manufacturers as well, however.

Even now, proposals have been made to expand the fiber-optic network by an additional 2,500 km.



Last October the Telecommunications Service completed a totally digital radio relay system from Stockholm to Goteborg to Malmo (map on left). According to the recent decision, 430 million kronor will be allocated to expand the main network with fiber-optic cable by 1989 (map in middle). An additional expansion by 1993 is also under consideration (map on right).

Key: 1. Fiber-optic cable

9336
CSO: 5500/2599

SWEDEN

ERICSSON REJECTS TECHNICAL COOPERATION WITH EUROPEAN FIRMS

Stockholm DAGENS NYHETER in Swedish 22 Feb 85 p 11

/Article by Kerstin Kall: "No From LM to Cooperation in Telecommunications"/

/Text/ LM Ericsson chooses to remain outside all European groupings in the area of telecommunications. Less than a month ago four of the largest companies in Europe agreed on technical cooperation on the telephone switchboards of the 1990's. This week AT&T and Philips have decided to expand their cooperation in Europe.

According to information from Philips, Ericsson has been offered collaboration, but declined. Ove Ericsson, who is the chief of the Public Telecommunications business are at LM Ericsson, says that the concern has received proposals for cooperation, but he is not willing to describe any details.

"We do not think that our current situation is such that we have a great need for a very broad cooperation partner," he says. "We might, on the other hand, consider collaboration within different limited areas."

In Europe French CIT-Alcatel, West-German Siemens, Italian Itatel and British Plesey have agreed on technical collaboration in order to make EG more competitive in regard to telephone systems.

Together the four companies will try to develop the digital telephone switch of the 1990's. One of the goals is also to try to create a common standard for the future digital networks in Europe. There are 60-70 scientists engaged in the project, which in the long run--hopefully--will result in a joint research center.

Does LM Ericsson's AXE manage in the coordinated competition?

"We are naturally constantly investigating how to further develop AXE," says Ove Ericsson. "But we do not think that the time has come yet to develop any successor to AXE."

Scepticism

"That might be what constitutes the difference between us and the others--a couple of them might need cooperation in respect to telecommunications," says Ove Ericsson.

The Italian-German-French-British agreement has been met with a certain amount of scepticism in Europe. It has been said that it involves more psychology than concrete cooperation. Ove Ericsson seems to represent the same line of thinking, when he, in a diplomatic way, says that it is not so terribly easy to develop joint telecommunications systems between different manufacturers.

"Collaborating involves not only technical but also commercial aspects," he points out.

Challenge

Sten-Olof Johansson, managing director of Ericsson and of the joint development company with the National Telecommunications Administration, ELLEMTEL, says that he believes that cooperation between different companies on the whole is hard and if cultural differences are added on top it becomes even harder.

"The advantage of collaborating with the National Telecommunications Administration is that we understand each other, we repesent the same language and the same culture," he says.

When the four European companies presented their agreement around the end of the month, Managing Director of Itatel, Marisa Bellisario, said that the project should be regarded as a challenge against such dominating U.S. companies as the American Telephone & Telegraph Co (AT&T) in the area of telecommunications in Europe.

AT&T and the Dutch Philips are now expanding the collaboration that was initiated a year ago when Philips had received a no from Ericsson in response to the offer to become partners. They are forming a new company in areas that the "mothers" have not yet penetrated, such as cable systems, microwave technology and systems for "turkey" projects in the area of telecommunications.

AT&T and Philips are going to concentrate on becoming secondary deliverers of equipment to the telecommunications market, an area that is becoming increasingly lucrative as the governmental telemonopoly is being loosened up.

Requested

In regard to the information industry at large, Kari Kairamo of Finnish Nokia has repeatedly requested a cooperation that might strengthen the competitiveness of the Nordic countries, the way the EG countries are now trying to act in regard to the U.S. companies.

Currently the electronics industries of the Nordic countries are competitors, they mostly buy their equipment outside the Nordic countries instead of from each other and they cooperate with partners outside the Nordic countries: Ericsson with the American Honeywell, Nokia with the Canadian Northern Telecom and Norsk Data with Racal.

Reluctant

Sweden's attitude is reluctance to a Nordic cooperation in regard to research and development.

"I do not know that there would be a need for such cooperation," says Sten-Olof Johansson of Ellemtel. "That would require that the companies that cooperate are of approximately the same size and that the cooperation would be equally advantageous for them."

9662
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SWEDEN

ERICSSON APPEALS FOR GOVERNMENT INTERVENTION IN COMPUTER DEAL

Stockholm SVENSKA DAGBLADET in Swedish 15 Feb 85 p 33

[Article by Johan Selander]

[Text] The managing director of Ericsson Information Systems, Inc., Stig Larsson, has written to Minister of Communications Curt Bostrom in an attempt to persuade him to intervene against the Postal Administration's order to Philips for cash terminals to be placed in 900 post offices. The order is worth nearly 350 million kronor.

In his letter, Stig Larsson writes that "the deliveries to the Swedish Postal Administration are of great strategic importance to Ericsson." He also says: "We also need the production that the order would involve in order to provide employment at our plants in the provinces."

Before the government approves of the Postal Administration's choice of supplier, Stig Larsson wants Ericsson Information Systems to be allowed to participate in a new "economic discussion." Stig Larsson suggests that the Postal Administration's choice may be a result of the cost models used.

Stig Larsson told SVENSKA DAGBLADET: "We put in a lot of work on our calculations, and they became quite complicated. I feel that it would have been a good thing if the Postal Administration had at least given us a chance to explain ourselves."

Decision in December

The Postal Administration made its decision in mid-December, and the matter was then turned over to the minister of communications for final approval. The letter from Ericsson is probably one reason why that approval has taken so long--it still has not been given.

We asked: "Is Ericsson Information Systems so bad off that you have to write to the minister of communications to get him to intervene?"

Stig Larsson answered: "Of course not. This is primarily a reaction to the Postal Administration."

Our next question was: "How important is this order to Ericsson Information Systems?"

He said: "If we have a big customer on the domestic market, that is a strong point when we offer this system to postal services abroad."

We asked: "What will happen to employment in Linkoping if, despite your letter to the minister of communications, you don't get the order?"

He said: "We will just have to try to sell something else. I can also see certain possibilities for solving the problem without laying people off. But to promise that is a hard thing to do."

In his letter, Stig Larsson also suggests that Ericsson could supply the actual work station with keyboard, video diplay terminal, and passbook recorder, while Philips could supply the rest of the system.

But Philips has rejected that solution in a letter of reply to the Ministry of Communications. In its letter, it says that a combination of system components from different suppliers would jeopardize the entire postal cash-dispensing system. Delivery times would be longer, and the Postal Administration would not gain any advantage from such a solution.

According to Philips, the Postal Administration's order is also of strategic importance to "the long-term survival of computer terminal activity in Jarfalla."

It is said that expansion by Philips in Kista is also dependent on a continuing qualified customer base in Sweden. Philips intends to employ about 500 people in Kista.

"Performance the Deciding Factor"

Philips also points out that the Postal Administration has fully complied with the so-called purchasing regulations in the deal with Philips--that is, total cost and performance were the deciding factors.

Computer terminal operations by Philips provide employment for over 600 people in Sweden at the advanced development and production facilities in Jarfalla.

The Postal Administration received a copy of Ericsson's letter for comment. But it is not interested in getting involved in any new discussions about price or about Ericsson's proposed alternative solution, which calls for splitting the order.

Minister of Communications Bostrom himself has not yet taken a stand.

11798
CSO: 5500/2578

SWEDEN

COUNTRY FIRST IN WORLD WITH NATIONWIDE DIGITAL FIBEROPTIC NETWORK

Stockholm DAGENS NYHETER in Swedish 12 Feb 85 p 11

[Article by Olof Bergman]

[Text] In 1987, Sweden will become the first country in the world with a nationwide digital network for the transmission of information. This was announced by the National Telecommunications Administration on Monday.

At the same time, according to AP-Dow Jones, a spokesman for Japan's telecommunications administration announced in Tokyo that a similar fiberoptic network went into operation there last Friday.

A fiberoptic network already exists between Stockholm, Goteborg, and Malmo for what is known as digital transmission, and it will form the framework for the future nationwide network that will be available for use in 1987 if the current schedule is maintained. When that happens, the entire country from Lulea to Ystad will be linked together in a digital telephone system. It is primarily firms with digital private exchanges that will benefit from the new technology thanks to faster transmission of speech, text, and data.

Speed

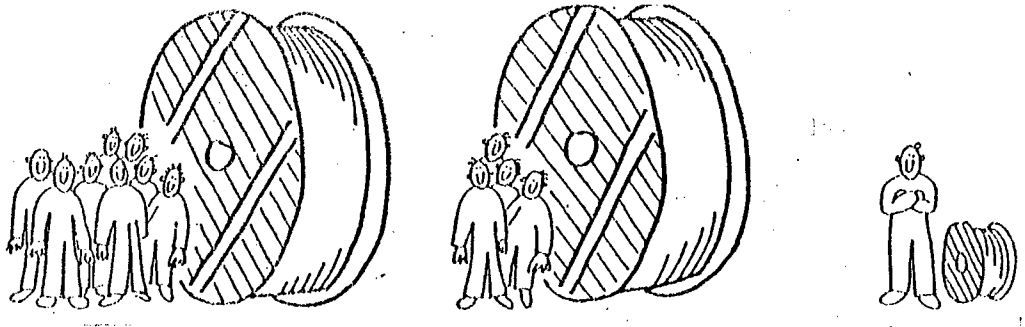
Transmission will be 25 times faster with the new network, said technical director Torsten Larsson at a press conference on Monday. Larsson, who is head of the National Telecommunications Administration's network division, and chief engineers Anders Carlsson and Lars Rydin were describing how what is already being called "Digital 87" will be built up and how it will operate.

"It is a little like changing engines in a jumbo jet while in flight." That was one image used by Larsson to describe the installation process. The light weight of fiberoptic cable makes it possible to work much faster than one could with conventional twin cable or coaxial cable.

The trio of experts from the National Telecommunications Administration admitted that the reconstruction work might cause interruptions in telephone traffic. Normally, however, the overload in the telephone network is not as great today as it was a couple of years ago. It is currently calculated that about 3 percent of all telephone calls are not completed, and that is a normal figure.

Comparisons Between Three Types of Cable

Twin cable	Coaxial cable	Fiberoptic cable
3.5 km	3.5 km	3.5 km
800 man-hours	400 man-hours	88 man-hours
20,650 kg	18,620 kg	350 kg



Conventional twin cable and coaxial cable are at least 25 times slower than the new optical digital network. Fiberoptic cable is also tremendously easier to handle--the figures above show how much labor is required to lay 3.5 km of cable of the three types and also how much each type weighs.

Growth

But the new network will provide greater resistance to overload, faster connections, a high degree of data security, and high flexibility.

The reason why the National Telecommunications Administration is investing in a digital network now is that data traffic has increased much faster than was ever expected. About 400 large private exchanges are now ready to handle digital traffic.

Digitization and the integration of services will make it possible to keep the rates low even in the future, say the experts from the National Telecommunications Administration. The possibility of joint traffic between different data services will increase in an integrated digital network.

Firms

The individual telephone subscriber may also find the new digital network beneficial. There will be less load on the network and faster connections, and it will be easier to take his telephone with him when he moves, regardless of where he goes.

The big beneficiaries, however, will be big firms that use a great number of data services in their operations. A good example is Volvo, which is cooperating with the National Telecommunications Administration in developing its own network for high-speed computer-to-computer transmission between Goteborg, Skovde, Koping, Arvika, and Olofstrom.

The ultimate goal over the next 5 years is to provide manufacturing units inside and outside the country with access to all the product information in Volvo's own data bases.

But the ultimate question is whether Japan is still one step ahead of Sweden in development. In the press cable mentioned at the beginning of this article, it was stated that so far, Japan has invested 65 billion yen (about 2.3 billion kronor) in the development of a nationwide fiberoptic network. That network has already been dubbed the "Shikansen of Information" after the famous high-speed train.

Japan's network is 3,300 kilometers long and stretches from Hokkaido in the north to Kyushu in the south. It links 34 cities. By the end of 1985, all major cities will be hooked up to the new network for digital telecommunication.

It is stated that along with the usual data services, subscribers will be able to talk to each other by means of a so-called videophone with "moving color pictures." Sweden's National Telecommunications Administration will not be able to offer anything like that before the end of this decade.

11798
CSO: 5500/2578

SWITZERLAND

DIGITAL EXCHANGES, FIBER OPTICS HELP PTT IMPLEMENT ISDN

Bern TECHNISCHE RUNDSCHAU in German 11 Dec 84 pp 16-19

[Article by Certified Engineer Rudolf Trachsel, PTT General Manager of the Communications Department: "Views on the Swiss Communications System"]

> [Text] Already today, Switzerland has a modern, well-dimensioned, efficient and superbly functioning communications network for the various services at its disposal. Without exaggeration, the same can be said with respect to digitalization and optical transmission, where we are among the leading countries in Europe.

One year has passed since the curtailment in the native development of an exchange system by the Swiss communications industry and the PTT enterprises. In the fall of 1983, the decision was made to introduce foreign base systems into the Swiss communications network. Everything that has happened subsequently confirms the correctness of this decision.

Thus far, it has been possible to order one transit and one local exchange of each of the three systems. They are to be turned over to the PTT from the end of 1986 through 1987. This works out to a time saving of about 2 years compared to a native development.

The technically obsolete electromechanical exchanges, which are significantly more expensive to procure and maintain than the modern digital systems, must therefore be procured for only a little while longer and in small numbers for the network expansion, thereby saving the PTT several hundred million francs in investments. The series introduction of the digital exchanges will begin on a large scale from mid-1987 on. Plans call for roughly a third of all equipment to be already either fully or partially digitalized after 5 years. In this way we will in a short time lay the groundwork for offering new services nationwide with the new technology. However, subscribers who continue to be linked to conventional exchanges will also profit from a modernization program.

Already today, the three systems selected in large measure meet the technical requirements established by the Swiss PTT enterprises. The fact that all three are offered on world markets on a competitive basis forces the manufacturers to continuously adapt them to the current state-of-the-art and to provide them with supplementary performance features.

The international electronically controlled digital switching system (EWSD) exchange which has been in operation since the end of August in the communications center in Zurich-Herdern is based on the technology of one of the three base systems. It does, however, constitute a special case, since it was ordered in 1981 already, i.e. prior to the integrated telecommunications system (IFS) decision--without prejudgment. In view of the very rapidly growing international traffic and the introduction of new signaling systems in our partner countries, we had to look for a modern solution in order to avoid bottlenecks and maintain a flawless quality of service. The electronic digital switching system EWSD from Siemens was practically the only one that presented itself for this purpose. Compared to conventional solutions, it is more economical and smaller.

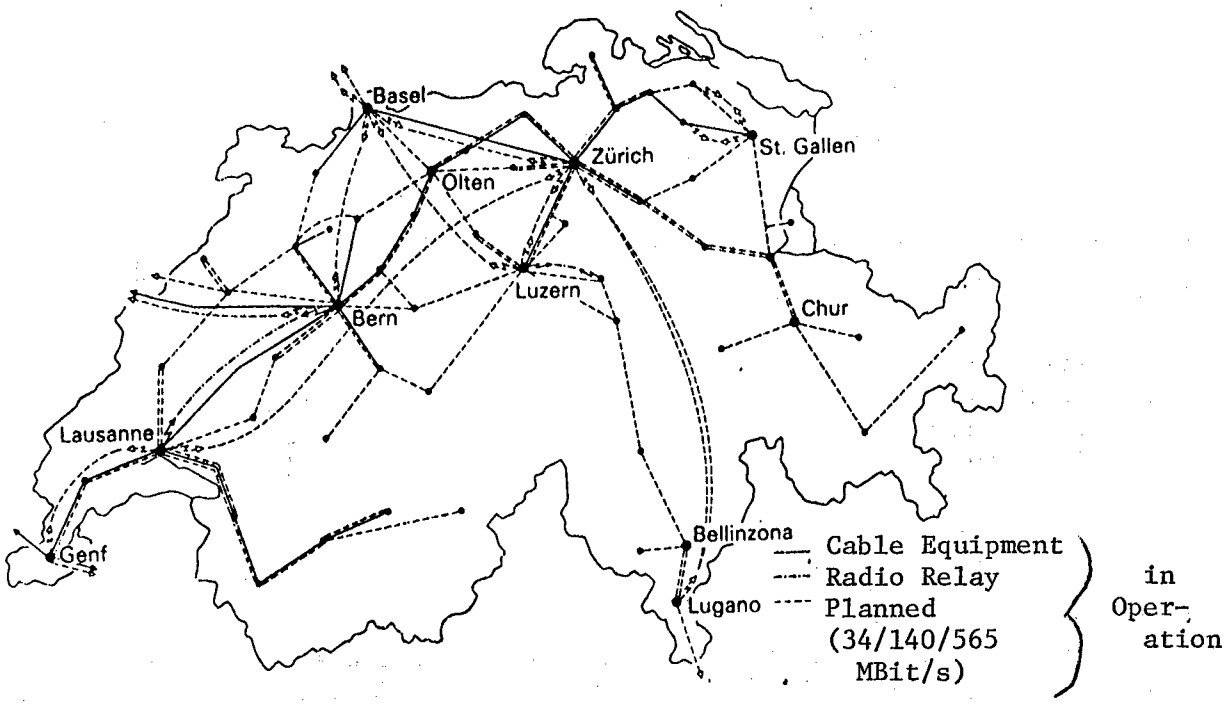


Figure 1. PCM [Pulse Code Modulation] Long Distance Network, Ten-Year Plan 1982 to 1991

En Route to the Integrated Services Digital Network (ISDN)

In the communications field, digital technology is asserting itself more and more. It is currently on the threshold of a significant developmental step: the transition to the integrated services digital network, abbreviated ISDN. With this, voice, text, data and picture are to be transmitted on an integrated network. The subscribers thereto are thus provided with connections that can be used in many ways, via which telephoning, telecopying, telex, Videotext and Teletext are possible, but which also allow access to data networks, such as Telepac; all this with high quality, availability, and on favorable terms.

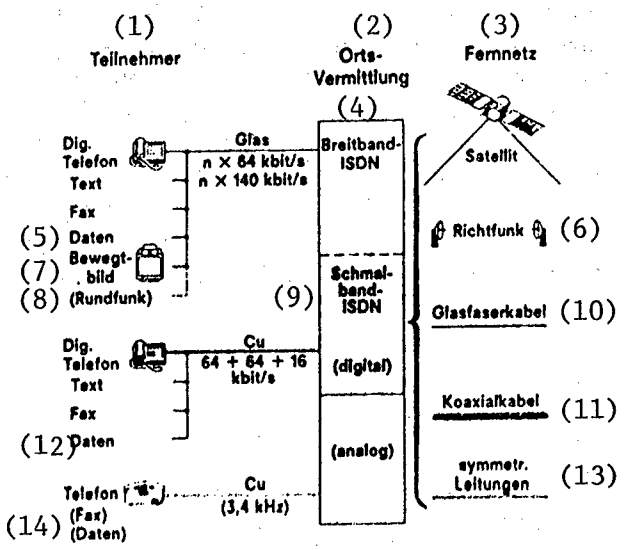


Figure 2. From Analog Network to Wideband ISDN

Key:

1. Subscriber
2. Local exchange
3. Long distance network
4. Wideband ISDN
5. Data
6. Radio relay
7. Moving picture
8. (Radio)
9. Narrow-band ISDN
10. Fiber optics cable
11. Coaxial cable
12. Data
13. Symmetrical lines
14. (Data)

All the leading countries in the field of communications technology are currently expending great efforts in the area of integrated services digital networks. Playing a major role in this is the standardization work for interfaces and procedures being done by groups of the European PTT administration CEPT [European Conference on Postal and Telecommunications Administration] and the international CCITT [International Consultative Committee for Telephony and Telegraphy]. Only in this way will the subscribers of the national ISDN networks later on be able to communicate with each other across the borders. In addition, the standardization will bring subscribers a many-faceted offering of equipment. The Swiss PTT too are intensively involved in this standardization work. Intensive preparations are under way here to make the ISDN available. In 1986 a trial network with the three basic integrated communications systems is to become reality. Various types of subscriber terminal equipment can be connected to this network. Through this, industry will be given the opportunity at an early date to become actually involved in the developments and to build up its knowledge in this area. The PTT in turn are capable of examining the technical as well as the operational problems and showing those interested the new possibilities. In that way, the offering of future services will be optimally keyed to customer desires.

Following various expansion phases of the trial network, the countrywide introduction of ISDN in Switzerland will presumably begin in 1989.

The necessity and advantages of digital technology in modern communications systems were perceived at a very early date in Switzerland. Already in 1969 we began with the installation of digital transmission systems. Since then this technology has been further improved and utilized more and more. Internationally, Switzerland is one of the leading countries in this area.

Our transmission network is based on an infrastructure of multiply utilized cables and radio relay systems, whereby a distinction is made between long distance, regional, and local networks.

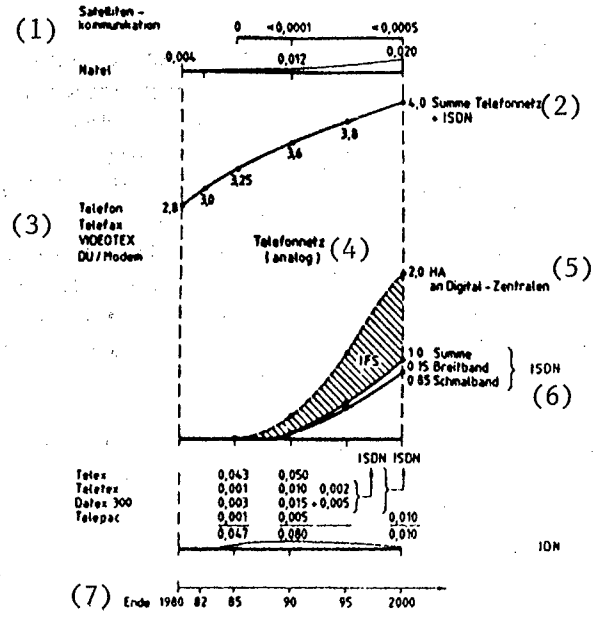


Figure 3. Number of Connections to Public Networks in Switzerland (in millions)

Key:
1. Satellite communications
2. Total of telephone network + ISDN
3. Data transmission/Modem
4. Telephone network (analog)
5. Connection to digital exchanges

6. Total, Wideband, Narrow-band } ISDN
7. End of...

Long Distance Network

In the long distance netowrk, mainly normal coaxial cables with twelve, and small coaxial cables with ten, tubes are laid. Analog transmission systems with 60 MHz operate on the former. Per pair of tubes, they yield 10,800 telephone channels. In the future, digital systems for 565 MBit/s will be installed almost exclusively, however. The performance capability of the 565 MBit/s systems is illustrated by the fact that the entire data content of the 18 Swiss telephone directories could be transmitted in less than 4 seconds, and the Old and New Testaments in less than one-tenth of a second.

Operating on small coaxial cables are 12 or 18 MHz analog, but also digital 140 MBit/s, systems. On such cables, analog and digital systems can be operated parallel to each other, which is important especially for the transition phase.

The future of line transmissions is significantly influenced by the glass fiber technology, however. The first two glass fiber long distance cable facilities--Zurich-Baden and Bern-Neuenburg--are currently under construction and will become operational in 1985. These are still multimode fibers, which will be used with 140 MBit/s systems. Beginning next year, however, monomode fibers will be used, which offer a transmission capability of 565 MBit/s.

By 1988 we plan to lay more than 400 km of optical long distance cables, the equivalent of circa 5,000 km of glass fiber. Included among these will also be two international 565 MBit/s facilities, which will link Switzerland with the German and Italian networks. Following the introduction of the 565 MBit/s system, no further analog equipment will be ordered.

A good third of the long-distance traffic in our country is routed wirelessly over radio relay links. The first digital facility began operations this year for data transmission between Lugano and Zurich.

Regional Network

The regional network still consists for the most part of pair-symmetrical cables, which since 1969 have been used with digital 2 MBit/s systems. The capacity of these lines was in this way increased at least fivefold. The PTT began very early, however, to employ the mini-coaxial cables so well suited for digital transmissions. These have 8, 16 or 40 mini-tubes, which to date have been used for systems with 8 MBit/s. In July of this year, the first 34 MBit prototype facility was put into operation on such a cable.

Already in 1979, the PTT employed the first fiber optical cables between two exchanges in Bern. Eight additional facilities have been completed to date with the same 8 MBit/s technology and a wavelength of 850 nm. The technical advances made in this field are very great. From next year on, a new generation of equipment for 1300 nm will be available. In this region there is less attenuation, and more than 30 km can be spanned without intermediate amplifiers. By 1988 we will lay nearly 560 km of regional optical cables.

Local Network

To date, the local network has been the least affected by the digital technology. However, this will change within this decade. The pair-symmetrical lines of the local networks are used for telephony and data transmission in the voice frequency region. The introduction of ISDN is also to bring about a better utilization of this very expensive cable infrastructure. Not just a single telephone conversation is to be possible per wire pair, but rather the simultaneous transmission of two telephone or rapid data channels and additional slow data links.

In city networks, the introduction of digital exchanges also causes the digitalization of the links between exchanges. The pair-symmetrical cables currently in use are only conditionally suited for this purpose. For this reason, the glass fiber technology will make its entry in this network area as well.

In addition, the PTT have worked out a future-oriented plan for distribution networks for radio and television programs and have made this known in connection with the discussion concerning the cabling of Basel. In principle, it provides for cooperation and work-sharing between the PTT and private enterprises. The PTT are responsible for bringing in the programs and for the rough distribution; the private enterprises are concerned with the precise distribution as far as the subscriber and with the programming. The primary distribution could be integrated into the inter-exchange glass fiber links of the PTT and would utilize circa 10 to 20 percent of their capacity. In the secondary network, in other words from the exchanges as far as the transfer points, to which the private enterprises connect their precise distribution, the PTT would utilize conventional coaxial cables. This solution is economical and makes sense.

Advantages of Digital Technology

Digital transmissions bring significant operational and economic advantages. Telephonic and data signals will hardly be affected by the distance factor and will thus be of very good quality. Compared to analog transmissions, digital transmissions are twice as economical, and in addition they can be applied to all future developments; they thus have a secure future and enable us to come up with modern solutions and to offer customer-oriented communications services.

Source: Trade press conference of the PTT together with AT&T and Philips Telecommunications Corporation as well as Siemens-Albis Corporation, September 1984.

12689
CSO: 5500/2581

BRIEFS

VATICAN RADIO BROADCASTING DEVELOPMENTS--Radio Vatican is installing a new directional aerial for 1530 KHZ medium wave, which is being built by AEG Telefunken, to improve reception. It intends to buy an additional 500 KW shortwave transmitter and to install a second rotational aerial for shortwave transmission. Radio Vatican may in future go in for direct satellite broadcasting. [Excerpt] [Vatican City International Service in German 1920 GMT 10 Feb 85 LD]

CSO: 5500/2614

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